tober 1986

ISSN 0253-4924

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FOOD TECHNOLOGY ABSTRACTS

Volume 21 No.10

October 1986

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National Information Centre for Food Science and Technology

Central Food Technological Research Institute,
Mysore – 570 013 India

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GENERAL

2458 COLOMBEL (R). Is the abandonment of a significant quantum of food production possibly a counterpart of the pursuit of industrial expansion in Japan? **Ind. Aliment. Agric.** 102(12); 1985; 1297-304 (French)

International pressure is being brought to bear on Japan (a) to internationalize the yen, and (b) to open the Japanese market to agricultural imports. The purpose behind these steps is to reduce Japan's enormous trade surpluses to a manageable size. The author has analyzed the present economic situation in Japan and discussed the possibility of Japan becoming a vast enterprise for the transformation, storage, and distribution of imported agricultural products. He has dealt in detail with (i) the current Japanese balance-sheet for food; (ii) evolution of the demand for food products and adaptation of the transformation industry; and (iii) the chances for the coming into existence of a combination of conditions that would open the Japanese market more and more widely to agricultural products. KMD

2459 GIBERT (H). New technologies in the agro-food industries. **Ind. Aliment. Agric.** 102(10); 1985; 989-94 (French)

Agro-food industries are undergoing a profound change. One direction of evolution would be the constitution of a modern agro-industry combine all the actors: viz., industrialists, chemists, and specialists in the transformation of biological products, with the object of producing foods, energy, and fine chemicals. This change is favourable for innovation, and the emergence of new technologies or new processes, by employing the processes of agro-food engineering. The author has reviewed some basic techniques and unit operations, so as to examine the progress that has been made, namely: liquid/liquid or liquid/solid dispersion by pulsation; membrane techniques; extrusion techniques; rational use of raw materials, energy, and labour; improvement of product quality; and improvement of tools. KMD

2460 PERRIMOND (C). Application of productics in the agro-food industries. **Ind. Aliment. Agric.** 102(10); 1985; 1035-8 (French)

2461 ANON. Testing of novel foods. **Br. Food J.** 87(927); 1985; 104-5

Discusses: Definition; development of voluntary procedures; guidelines; long term toxicology and carcinogenic tests; studies in humans; and after acceptability. BSN

2462 HASHIMOTO (S), FURUKAWA (K) and OZAKI (Y). A channel flow system for waste water treatment and food production. **J. Ferment. Technol.** 63(4); 1985; 343-56

Treatment of diluted synthetic waste water and synthetic night soil with Pak-Bung (**Ipomoea aquatica**) and Tilapia (**Tilapia nilotica**) resulted in mean TOC, T-N and T-P removal of more than 90%, 14-43% and 7-58% respectively with a retention time of 2-8 days. Under optimum conditions, the crop yield of Pak-Bung was maintained at 1.5 kg/week/3.15 m^2 and the harvested Pak-Bung contained abundant vital amino acids and vitamins. KAR

FOOD PROCESSING AND PACKAGING

Processing

2463 DANFORS (S). Nutrient losses and gains during the preparation of foods. Varfoda 37(8); 1985; 401-7 (Swedish)

The present investigation has shown small losses (0-5%) of thiamin, riboflavin and niacin. However, greater losses will occur when leaching takes place and the boiling water is not used. The losses were more pronounced for vitamin B6 (10-30%), retinol (10-20%) and particularly for ascorbic acid (40-100%). The losses of minerals were generally moderate (0-10%), except for potassium (0-50%) and were mostly due to leaching. AA

2464 ANON. The effects of food processing on nutritional values. **Br. Food J. 87(927)**; 1985; 106-7

Discusses: Treatment methods; harvesting; milling; other cereal; cold temperature treatment; research development; and deep freezing. BSN

2465 ANON. The effects of food processing on nutritional values. Part II. Br. Food J. 87(928); 1985; 132-4, 136

Briefly discusses: milk; vitamins and proteins; chemical treatment; new sources; and irradiation for preservation of food. BSN

Packaging

2466 CATALA (R) and CABANES (JM). Electrochemical evaluation of shelf-life of foods canned in lacquered tinplate cans. **Rev. Agroquim. Tecnol. Aliment. 25(4)**; 1985; 521-31 (Spanish)

FOOD ENGINEERING AND EQUIPMENT

2467 CHIRIFE (J), SUAREZ (C) and IGLESIAS (HA). The calculation of the heat of water sorption in foods on the basis of B.E.T. theory. **J. Food Technol. 21(1)**; 1986; 103-7

Data obtained after an extensive investigation on evaluation of the heat of water sorption using the B.E.T. theory (using a more general expression (parameter) to confirm/extend the results of Suarez (1983) and Aguerre **et al.**, (1984), have been presented and discussed. BSN

2468 PEUCHOT (Ch). Methods of characterisation of suspensions - Concentration, turbidity, granulometry. **Ind. Aliment. Agric. 102(10)**; 1985; 999-1003

The author has dealt with the measurement of the concentration of suspended matter, and then defined turbidity and described the apparatuses used to determine turbidity. Next, a particular pollution has been analysed by unidimensional class in relation to population and volume. The principal apparatuses available for measurement of turbidity have been described; they are based either on the use of a source of light, or on the variations in conductivity of the flux through a calibrated orific. Granulometric analysis enables one to define an average diameter of the particles, and the dispersion around this average. KMD

2469 ADLER (W), EFFEY (G), LOFFELMANN (R) and SCHMIDT (H). Tower headpiece filter as a new separation system in the spray drying. **Fette**

Seifen Anstrichm. 87(10); 1985; 411-3 (German)

2470 MIETTON-PEUCHOT (M) and PEUCHOT (Ch). Filtering media - Description and characterization. **Ind. Aliment. Agric. 102**(10); 1985; 1005-11 (French)

The principal families of filtering media have been described; in particular, those based on powdered materials (filtration adjuncts), thick filters (plates, ground glass, felt) and membrane filters (woven, polymerized, mineral, perforated). Screening membranes with perfectly calibrated pores are distinguished by their technique of manufacture and their low porosity. The characterization of filtration media by means of various parameters (hydraulic resistance, etc.) has also been touched upon. KMD

2471 DAVIN (A). Clarifying filtration and sterilizing filtration. **Ind. Aliment. Agric. 102**(12); 1985; 1293-6 (French)

Agro-food liquids often have to be clarified (i.e. their suspended solids have to be eliminated) in order to improve their appearance (i.e. increase their brilliance). Destruction of micro-organisms, on the other hand, has been accomplished by classical heat treatments. But it is also possible to eliminate them by a solid/liquid separation, by making a correct choice of the apparatus to be used. Such a procedure would eliminate a unit operation, and could be applied also to biological liquid media containing heat-sensitive materials, at various intermediate stages of media. The author claims that it is quite possible, now a days, to sterilize solutions by means of an appropriate solid/liquid separation technique. KMD

ENERGY IN FOOD PROCESSING

2472 CAUSSE (M). Update on the twin energy sources - fuel/electricity - in the food industry. **Ind. Aliment. Agric. 102**(10); 1985; 1017-20 (French)

FOOD CHEMISTRY

2473 HERNANDEZ (M) and SALA (JM). Reproducibility of electro-ultrafiltration method (according to grimme), to determine the soil potassium desorption half-time. **Rev. Agroquim. Tecnol. Aliment. 25**(4); 1985; 599-606 (Spanish)

2474 WARD (FW), COATES (ME) and WALKER (R). Nitrate reduction, gastrointestinal pH and N-nitrosation in genobiotic and conventional rats. **Food Chem. Toxicol. 24**(1); 1986; 17-22

2475 BALDI (M), BOVOLENTA (A), PENAZZI (L), PEDERZINI (C), BURIANI (S) and POCATERRA (F). GLC-ECD determination of 1-naphthaleneacetic and 2-naphthoxyacetic acids as their pentafluorobenzyl esters and confirmation by HRGC. **Industria Conserve. 60**(4); 1985; 304-9 (Italian)

2476 GUILARTE (TR). Analysis of biotin levels in selected foods using a radiometric microbiological method. **Nutr. Rep. Int. 32**(4); 1985; 837-45

A radiometric-microbiological assay (RMA) using **Kloeckera brevis** as test organism was applied to the analysis of biotin in a variety of food samples. Among the samples analyzed wheat germ, oatmeal, 40% Bran Flakes, beef liver and egg yolks had the highest biotin levels. The RMA was also compared to the conventional **Lactobacillus plantarum** tu

bidimetric assay. With the exception of cereals there was good agreement between assays. For cereals, the L. plantarum assay gave lower biotin values than the RMA. This discrepancy may be attributed to the removal of biotin in the filtering step of the extraction procedure. AA

FOOD LAWS AND REGULATIONS

Nil

FOOD MICROBIOLOGY

Fermented products

2477 FUKUSHIMA (D). Fermented vegetable protein and related foods of Japan and China. **Food Rev. Int. 1**(1); 1985; 149-209

2478 ODUNFA (SA). Microbiological assay of vitamin B and biotin in some Nigerian fermented foods. **Food Chem. 19**(2); 1986; 129-36

The B vitamins and biotin contents of raw seeds, cooked unfermented seeds and the fermented products of castor oil and African oil bean are reported. KAR

Soy sauces

2479 NAGAHARA (A), OHSHITA (F) and NASUNO (S). Relation of nitrite concentration to mutagen formation in soy sauce. **Food Chem. Toxicol. 24**(1); 1986; 13-5

When soy sauce was mixed with nitrite solutions at pH 1.0 and 3.0, only mixtures containing nitrite concentrations above 250 ppm were mutagenic in the **Salmonella**/mammalian microsome test. In buffered aqueous solution (pH 3) the mutagen precursor. (-)-(1S, 3S)-1-methyl-1,2,3,4-tetrahydro- -carboline-3-carboxylic acid [(1S.3S)-MTCA] and its stereoisomer (-)-(1R,3S)-MTCA reacted with 10 ppm or more of sodium nitrite; but at least 250 nitrite was required for them to react in soy sauce) (pH 3). Similarly, another mutagen precursor, tyramine, did not react even with 2300 ppm nitrite in soy sauce (pH 1), although pure tyramine in aqueous solution (pH 1) reacted with as little as 50 ppm nitrite. Nitrite concentration in human saliva and gastric juice does not generally exceed 50 ppm. Therefore, the most probhable source of mutagens - nitrosation of MTCAs and tyramine - is likely to be very restricted **in vivo** and soy sauce is unlikely to be significantly mutagenic. AA

Escherichia

2480 FARBER (JM). Potential use of membrane filters and a fluoregenic reagent-based solid medium for the enumeration of **Escherichia coli** in foods. **Can. Inst. Food Sci. Technol. J. 19**(1); 1986; 34-7

A direct plating method using as the medium buffered tryptone bile agar with 4-methylumbelliferyl- -D-glucuronide added was evaluated for its ability to enumerate **Escherichia coli** at 44.5 C. The clarity of the result depended on the type of membrane filter used. The fluorescence observed from colonies growing on cellulose nitrate or mixed esters of cellulose was strong. Limited trials with food showed good recovery of **E. coli** when compared to the direct plating method based on indole production, of the Health Protection Branch (Method MFA-27). The method appears to be a simple, rapid, reliable

alternative to the indole method for the enumeration of **E. coli** in foods. AA

Lactobacillus

2481 BRENNAN (M), WANISMAIL (B), JOHNSON (MC) and RAY (B). Cellular damage in dried **Lactobacillus acidophilus**. **J. Food Prot.** 49(1); 1986; 47-53

Lactobacillus acidophilus cells surviving freeze drying and vacuum drying became sensitive to oxgall and lysozyme probably from damage to the cell wall. The dried cells also became sensitive to NaCl and permeable to orthonitrophenol β-galactoside from damage to the cytoplasmic membrane. Scanning electron microscopy indicated loss of some surface material from the damaged cells. Transmission electron microscopy (TEM) revealed partial loss of wall and membrane material, but these losses seemed to have resulted from the treatments given during fixation of cells for TEM and as a consequence of damage to the wall and membrane that occurred during drying. A surface protein of 46-kilodalton molecular weight, that is bound to the wall by hydrogen bonding, was also lost from the dried cells. It is postulated that drying adversely affects some weak bonds of the cellular macromolecules probably from the loss of bound water. AA

Pseudomonas

2482 THOMPSON (SS), NAIDU (YM) and PESTKA (JJ). Relationship between extracellular neutral protease production and appearance of bleb-like evaginations in **Pseudomonas fragi**. **J. Food Prot.** 48(12); 1985; 1067-70

Pseudomonas fragi is one of several pseudomonads known to produce proteolytic enzymes. During growth of **P. fragi** in brain heart infusion broth (BHI) at 10 C, the bacterial population increased from 10^7 to over 10^{10} CFU/ml after 130 hour, with a concurrent increase in pH from 7.4 to 8.5. Maximal extracellular protease activity occurred afcter 60 to 72 hours. Ultrastructural examination of cells grown in BHI showed the presence of bleb-like evaginations of the cell wall. Similar structures were not detected when P. fragi was grown in Koser citrate broth, a medium which was unsuitable for supporting protease production by **P. fragi**. AA

Streptococcus

2483 RYMASZEWSKI (J), CICHOSZ (G) and KUJAWSKI (M). Properties of β-galactosidase from cells of **Streptococcus lactis** 192 and **Lactobacillus lactis** F-16 strains. **Acta Aliment. Polonica.** 11(25); 1985; 449-60

Saccharomyces

2484 PODGORSKA (E). Effect of selenium on nitrogen transformation in the yeasts **Saccharomyces cerevisiae** and **Candida tropicalis**. **Acta Aliment. Polonica.** 11(25)(4); 1985; 437-48

2485 LALUCE (C) and MATTOON (JR). Development of rapidly fermenting strains of **Saccharomyces diastaticus** for direct conversion of starch and dextrins to ethanol. **Appl. Environ. Microbiol.** 48(1); 1984; 17-25

Single cell proteins

2486 MONTET (D), RATOMAHENINA (R), LABORDE (JM), PINA (M), GRAILLE (J) and GALZY (P). Single cell protein production from industrial soapstocks. **Oleagineux.** 40(10); 1985; 505-9 (French)

Soapstocks are a by-product of the chemical refining of fats and oils. Generally, they are used in the soap industry or as a source of fatty acids for oleochemicals. The bioconversion into single cell pro-

teins for animal feed and edible yeasts for consumption is proposed. Screening of different yeasts has been carried out and 5 strains have been selected for their growth rate, their high yield and their high protein content. Some analytical characteristics of such yeasts are given. AA

Aspergillus

2487 GEMBICKA (D) and SZEBIOTKO (K). Glucoamylase biosynthesis in **Aspergillus** fungi in conditions of periodic calcium deficiency. **Acta Aliment. Polonica.** 11(25)(4); 1985; 427-36

Mushrooms

2488 GORMLEY (TR) and WALSHE (PE). Shrinkage in canned mushrooms treated with xanthan gum as a pre-blanch soak treatment. **J. Food Technol.** 21(1); 1986; 67-74

Vacuum treating freshly harvested mushrooms with a 1% xanthan gum solution (XVT) containing 0.25% sodium metabisulphite (SMBS) prior to blanching and canning gave a lower shrinkage value than for corresponding samples vacuum treated with water, or those canned by conventional means or the 3S process. A combination of chill storage (2-4 C) for 1-3 days coupled with 1% XVT was found best and gave even lower total canning losses (chill storage loss + blanch loss + retort loss); these were 6% lower than in the 3S process and 11.5% lower than for mushrooms canned by the conventional procedure. These data suggest that xanthan gum has considerable potential for reducing shrinkage in canned mushrooms. The XVT canned samples had an excellent colour and an acceptable texture. Further storage tests over a 9 month period with xanthan treated canned mushrooms showed than an SMBS level of 0.1% in the pre-blanch soak solution maintained an excellent colour in the canned product. No in-can mushroom shrinkage took place during the 9 month storage test. AA

FOOD ADDITIVES

Antifoaming agents

2489 RICHTERICH (K), GODE (P) and GUHL (W). Ecological evaluation of a new non-ionic antifoaming agent. **Fette Seifen Anstrichm.** 87(10); 1985; 421-4 (German)

Butylated hydroxytoluene

2490 OLSEN (P), MEYER (O), BILLE (N) and WURTZEN (G). Carcinogenicity study on butylated hydroxytoluene (BHT) in Wistar rats exposed in utero. **Food Chem. Toxicol.** 24(1); 1986; 1-12

Carotenes

2491 HEYWOOD (R), PALMER (AK), GREGSON (RL) and HUMMLER (H). The toxicity of beta-carotene. Toxicology. 36(2,3); 1985; 91-100

The safety of β-carotene, a widely distributed food colourant was assessed in tests with cells and in sub-chronic and chronic experiments with animals. Mutagenicity evaluations which included the standard Ames test and the micro-nucleus test of bone marrow cells from mice showed that β-carotene exerted no mutagenic properties. Embryotoxicity studies in rats and rabbits showed that there was no evidence of embryotoxicity and a multiple generation study in rats showed that there was no interference with the reproductive function

in rats given oral doses of up to 1000 mg/kg/day. Chronic toxicity was studied in a 2-year study with dogs in a toxicity/tumorigenicity study in rats and in a mouse carcinogenicity study. Histological findings in the livers of treated dogs and mice, but not in rats, included vacuolated cells with eccentric nuclei which were distributed in periportal areas and which were frequently associated with minimal lipid deposition. There was no evidence that the vacuolisation was dose-related. It was considered that the vacuolated cells were fat storage cells. There was no effect on the tumor profiles in the rat and the mouse studies. AA

Sweeteners

2492 JANELM (A) and MOVITZ (J). Sweeteners as food additives: Regulations for use and labelling. **Var Foda. 37**(9-10); 1985; 442-51 (Swedish)

2493 HALLSTROM (H) and JANELM (A). Sweeteners then and now: From honey to aspartame. **Var Foda. 37**(9-10); 1985; 434-9 (Swedish)

2494 HALLSTROM (H). Less common sweeteners derived from plants. **Var Foda.** 37(9-10); 1985; 520-22 (Swedish)

The article contains short notes on the following substances: thaumatin; neohespiridine dihydrochalcone; stevioside; glycyerhizin; miraculin; and monellin. None of these has been approved as a food additive in Sweden. KMD

2495 HALEN (B). Analysis of artificial sweeteners. **Var Foda.** 37(9-10); 1985; 523-5 (Swedish)

Analytical methods developed and used by the Swedish National Food Administration (SLV) to check the use of the synthetic sweeteners saccharin, cyclamate and aspartame in various foods are summarized. Reference is also made to methods issued by the Nordic Committee on Food Analysis (NMKL). At SLV, liquid chromatographic assays are used for saccharin and aspartame, with verification of identity being achieved by means of thin layer chromatography. The presence of saccharin has been investigated in several products and illegal use has only been found in two of these, mustard and pickled herring. No investigations have been performed on cyclamate since its use in foods was prohibited in 1970. AA

Acesulfame

2496 HALLSTROM (H). The toxicity of acesulfame K. **Var Foda.** 37(9-10); 1985; 516-9 (Swedish)

Acesulfame K is completely absorbed and rapidly eliminated in humans and test animals. There is no evidence of metabolic transformation or accumulation of the substance. The acute toxicity of acesulfame K is very low. In subchronic studies using rats the most prominent effects of acesulfame K at high doses are enlargement of the caecum, diarrhoea and reduction of body weight. These effects are probably related to the potassium content. In long-term feeding studies in rats an increased incidence of pulmonary lymphoreticular tumours and mammary gland fibroadenomas was observed. There was, however, no relation between dose and response. Acesulfame K has not exhibited any mutagenic or teratogenic effects. The Joint FAO/WHO Committee on Food Additives (JECFA) has recommended an acceptable daily intake for man of 9 mg per kg body weight for acesulfame K. Acesulfame K has not yet been approved as a food additive in Sweden. AA

Aspartame

2497 SLORACH (SA). The toxicology of aspartame. **Var Foda.** 37(9-10); 1985; 503-6 (Swedish)

Aspartame is metabolised in the human body to the amino acids phenylalanine and aspartic acid, which both take part in the normal metabolism of the body. In addition, methanol is released. The results of extensive studies in both experimental animals and man show that it is unlikely that the use of aspartame as a sweetening agents in foodstuffs will result in any health risks for the general population. The amounts of aspartame consumed are relatively small and the sweetening effect is so potent that the current acceptable daily intake for man (ADI) of 2.4 g of aspartame for an adult, corresponds to the sweetening effect of 480 g of sugar. Certain individuals who suffer from a reduced ability to metabolise phenylalanine (phenylketonuria) should, however, avoid or restrict their intake of aspartame-sweetened foods. AA

Cyclamates

2498 SLORACH (SA). Toxicological evaluation of cyclamate. **Var Foda.** 37(9-10); 1985; 497-502 (Swedish)

Cyclamate was discovered in 1937 and its use increased rapidly during the 1960s. However, suspicions that it was carcinogenic led to a ban on its use as a food additive in Sweden, the USA and several other countries in 1969. In Sweden cyclamate is now once again approved for use in sweetening tablets etc, but not as an additive to other foods. The background to the current Swedish toxicological evaluation of cyclamate as a food additive is given in this paper. AA

Saccharin

2499 SLORACH (SA). The toxicology of saccharin. **Var Foda.** 37(9-10); 1985; 491-6 (Swedish)

In contrast to most carcinogens, saccharin does not bind to DNA and it does not appear to have any other appreciable genotoxic effects. A large number of epidemiological studies have been carried out to investigate whether the relatively small amounts of saccharin ingested by man increase the risk for bladder cancer. It is concluded that such ingestion of saccharin leads to little or no increase in the risk for bladder cancer; neither does it involve any appreciable risk for other negative health effects. This paper gives a summary of the background to these conclusions. AA

CEREALS

2500 WACHE (H). Efficient and economic operational procedure in a mill by modern test methods. **Getreide Mehl Brot.** 39(12); 1985; 358-61 (German)

2501 SMIETANA (Z), FORNAL (L), SZDEBDOWSKI (J) and SDRAL-SMIETANA (M). Extrusion as a process of modification of the physico-chemical properties of cereal proteins and their mixtures with milk proteins. **Getreide Mehl Brot.** 39(11); 1985; 344-8 (German)

The addition of milk proteins results in changes in the solubility, buffering capacity, and molecular weight of the proteins of extruded products made from milled cereal products. A high proportion of reactive milk proteins increases the formation of aggregates with cereal proteins during extrusion, and this, in turn, influences the free groups of reactive proteins. Complex chemical changes in the pro-

teins can be measured by means of the alterations in their physico-chemical properties; such alterations can be exploited to control the chemical structure. Of the extrudates that are formed, so as to make an end-product having certain pre-specified functional properties and expansion coefficients. KMD

2502 LAI (FS), ZAYAS (I) and POMERANZ (Y). Application of pattern recognition techniques in the analysis of cereal grains. **Cereal Chem. 63**(2); 1986; 168-72

Objective methods are required to characterize grains in plant breeding programs and in marketing channels. Pattern recognition techniques can be used as an aid in such characterization. Pattern recognition, a learning algorithm stored in a computer, was found effective in identifying and classifying cereal grains. Patterns of six grains (corn, soybeans, rice, sorghum grain, barley, and wheat) were developed, and the patterns were tested for their accuracy in the recognition of grains. In addition, the technique was applied to differentiate between brown and white race and in the study of sphericity of corn kernels. AA

2503 McGUIRE (CF). Quality evaluation of distillers' dried grain by near-infrared analysis. **Cereal Chem. 63**(2); 1986; 155-9

2504 FROSCHER (H). Transport of grain products and feedstuff with silo-vehicles. **Getreide Mehl Brot. 39**(12); 1985; 356-8 (German)

2505 PIIRONEN (V), SYVAOJA (E-L), VARO (P), SALMINEN (K) and KOIVISTOINEN (P). Tocopherols and tocotrienols in cereal products from Finland. **Cereal Chem., 63**(2); 1986; 78-81

This study is part of a comprehensive survey carried out to determine the tocopherol and tocotrienol contents of Finnish foods. They were analyzed from 39 milling, flour-based, and bakery products using a high-performance liquid chromatographic method. Their compositions were highly variable. Among the milling and flour-based products α-tocopherol was predominant in wheat germ only. Wheat flour of ash content 1.2-1.4% and rye flour of ash content 0.9-1.0% contained about equal amounts of α-tocopherol and β-tocotrienol. In most other milling products α-tocotrienol or β-tocotrienol predominated. The richest sources of vitamin E were wheat germ, bran, meal and flour of ash content 1.2 - 1.4%, rye meal, and oat products (vitamin E content $\geq$ 1.3 mg of α-tocopherol equivalents/100 g), and the poorest sources were white wheat flour, macaroni, semolina, polished rice, rice crispies, whole grain millet, and corn flakes ($<$ 0.3 mg). The composition and content of vitamin E in bakery products were greatly dependent on the type and amount of added fat. For most bakery products the vitamin E content ranged from 0.8 to 1.5 mg of α-tocopherol equivalents/100 g. Cereal products make a substantial contribution to the vitamin E intake of Finns. AA

Barley

2506 BHATTY (RS). The potential of hull-less barley. A review. **Cereal Chem. 63**(2); 1986; 97-103

Discusses: Hullless - character of barley; field versus malting barley; nutritional value of barley for swine; nutritional value of barley for poultry; food uses of barley; milling of hull less barley; malting of hull less barley; and pearling of hull less barley. BSN

2507 CHUNG (KM), CHUNG (DS) and SEIB (PA). Brewers' condensed solubles. III. Enzymatic hydrolysis, viscosity reduction and fermentation. **Cereal Chem. 63**(2); 1986; 124-30

2508 WU (YV). Fractionation and characterization of protein-rich material from barley after alcohol distillation. **Cereal Chem. 63**(2); 1986; 142-5

Buckwheat

2509 FORNAL (L), SMIETANA (Z), SORAL-SMIETANA (M), FORNAL (J) and SZPENDOWSKI (J). Products extruded from buckwheat flour and its mixtures with milk proteins. II. Chemical characteristics and physico-chemical properties of proteins and starch of products extruded from buckwheat flour and its mixture with milk proteins. **Acta Aliment. Polonica. 112**(4); 1985; 397-411

Rice

2510 ASAOKA (M), OKUNO (K), SUGIMOTO (Y), YANO (M), OMURA (T) and FUWA (H). Structure and properties of endosperm starch and water soluble polysaccharides from sugary mutant of rice (**Oryzae sativa** L.). **Starch. 37**(11); 1985; 364-6

Structure and properties of starch and water soluble polysaccharides (WSP) from sugary (**su**) endosperm of rice were examined. The **su** starch contained more amylose and had a somewhat higher ratio of the short chains to the long chains of amylopectin than normal starch. The WSP consisted of short α-1,4-chains and their average degree of polymerization was 8.6 glucose units. Susceptibility of the **su** starch to crude **Rh.** glucoamylase was higher than that of the normal. The initial and final temperatures and heat of gelatinization of the **su** starch granules were much lower than those of the normal ones. AA

2511 AGUERRE (R), SUAREZ (C) and VIOLLAZ (PE). Effect of drying on the quality of milled rice. **J. Food Technol. 21**(1); 1986; 75-80

Degree of breakage during milling increased as drying temperature increased from 40-70 C and RH showed decreasing values. Activation energy was much higher than of drying rice. BSN

2512 MOSQUEDA (MBde), PEREZ (CM), JULIANO (BO), ROSARIO (RRdel) and BECHTEL (DB). Varietal differences in properties of extrusion-cooked rice flour. **Food Chem. 19**(3); 1986; 173-87

2513 EGGUM (BO), JULIANO (BO), IBABAO (GB) and PEREZ (CM). Effect of extrusion cooking on nutritional value of rice flour. **Food Chem. 19**(3); 1986; 235-40

Extrusion cooking, in a twin-screw extruder, of milled rice batter at 15% moisture and 120-150 C reduced total lysine content 11-13% true digestibility 3%, biological value 4-5% and NPU 7-8% in growing rats. AA

Rice bran

2514 CHAMPAGNE (ET), RAO (RM), LIUZZO (JA), ROBINSON (JW), GALE (RJ) and MILLER (F). Isolation and identification of soluble magnesium and potassium phytates from rice bran. **Cereal Chem. 63**(2); 1986; 160-63

Soluble magnesium and potassium phytates and inorganic magnesium and potassium phosphates in rice bran were isolated on Sephadex G-25-50. The eluting phosphorus, magnesium, and potassium components were identified by inductively coupled plasma spectroscopy. The isolated soluble magnesium and potassium phytates had low metal to phytate ratios: approximately two magnesium ions and one potassium ion per phytate molecule at endogenous pH (7.1). The compositions of these soluble metal-phytate species were found to be pH-dependent. The number of magnesium and potassium ions associated per phytate molecule decreased with decreasing pH. At pH 2.7, no potassium ions were found

associated with the soluble phytate, and the magnesium-to-phytate ratio was less than 1:1. AA

Rye

2515 STELLER (W), BECKER (HG) and WAHRBURG (U). Evaluation of rye by consumer research. **Getreide Mehl Brot.** 39(11); 1985; 348-50 (German)

At the turn of the century, rye played a more prominent role than wheat in German bread and baked goods. Today, wheat and rye are used in the ratio 80:20 in German bread. There are many reasons for this shift. But, in the minds of bread consumers, many positive qualities are still associated with rye: rye bread is considered to be more healthy, acceptable, and digestion-promoting; its characteristic and strong taste is highly appreciated, as also its better keeping quality. Wholemeal bread and rye bread are regarded as being comparable in many respects. The fact that rye helps to extend the variety of bread and small baked goods available on the market, has been a major factor in stopping the declining trend in bread consumption after the Second World War, and even increasing consumption from about 1975 onwards. KMD

Triticale

2516 FORTUNA (T), GAMBUS (H), NOWOTNA (A) and PALASINSKI (M). Studies on the suitability of triticale for starch production. **Acta Aliment. Polonica.** 11(25)(1); 1985; 53-62

Wheat

2517 BOLLING (H) and MEYER (D). Processing value of new wheat cultivars 1985. **Getreide Mehl Brot.** 39(11); 1985; 323-9 (German)

2518 KONIJNENDIJK (NE). Quality of US - wheat crop 1985. **Getreide Mehl Brot.** 39(11); 1985; 329-31 (German)

2519 ZWINGELBERG (H). Investigation on the rate of feeding in of wheat in a roller mill. I. Break. **Getreide Mehl Brot.** 39(11); 1985; 332-7 (German)

Keeping in mind a given particle size distribution, one can mill up to 1000 kg of wheat through 1 dm length of a roller at a speed (w_1) of 9.8 m/s, and with a forward slip of 2.5:1. On increasing the roller speed, quantity of wheat put through, and the forward slip, the ash content of the flours, grits, and dusts increases. Since in existing roller mills, it is impossible to increase the roller speed without increasing the wheat throughput, the forward slip of the first grits roller should not exceed 2.5:1. On an average 5 kW of power is needed to ensure a throughput of 1000 kg of wheat, with a milling gap of 0.5 mm. KMD

2520 SALOMONSSON (L) and LARSSON-RAZNIKIEWICZ (M). Methods for fractionation and characterization of proteins in wheat. **Swedish J. Agric. Res.** 15(4); 1985; 123-31

The Osborne fractionation method is preferable in investigations of protein compositions in wheat grain as it does not dissociate the functional proteins. Acetic acid, urea, N-cetyl-N,N,N,trimethylammonium bromide, extraction followed by gel filtration was used to study effects of storage on protein composition of wheat grain. KAR

2521 PAGANUZZI (AS), ZUCCO (F), CARDELLI (M), De ANGELIS (I), MATTEI (R), PINO (A), ROCCA (E) and ZAMPAGLIONI (F). Cytotoxic effects of wheat gliadin-derived peptides. **Toxicology.** 37(3,4); 1985; 225-32

2522 PLATT (SR) and CLYDESDALE (FM). Effects of iron alone and in combination with calcium, zinc and copper on the mineral-binding capacity of wheat bran. **J. Food Prot. 49**(1); 1986; 37-41

The addition of various combinations of iron, calcium, zinc and copper to soft white wheat bran (SWWB) and hard red spring wheat bran (HRSWB) was shown to effect both the solubility of added minerals and those occurring endogenously. The addition of equimolar concentrations of Fe and Zn resulted in a significant decrease in soluble iron of 5.4% and 9.0% for SWWB and HRSWB, respectively, and a significant decrease in soluble magnesium, compared to wheat bran systems with iron alone. However, when equimolar concentrations of Fe and Cu were added to the wheat bran systems, there was no significant effect on Fe solubility and a significant increase in Mg solubility. Further, the addition of Fe and Ca (160 mg) to the wheat bran systems caused a significant decrease in soluble iron of 12.0% for SWWB and 17.4% for HRSWB, and a signifi ant increase in Mg solubility. These results suggest that there are mineral-specific binding sites in wheat bran. AA

2523 SEITZ (LM), EUSTACE (WD), MOHR (HE), SHOGREN (MD) and YAMAZAKI (WT). Cleaning, milling, and baking tests with hard red winter wheat containing deoxynivalenol. **Cereal Chem. 63**(2); 1986; 146-50

Seven commercial lots of 1982 hard red winter wheat were selected for cleaning, milling, and baking tests. Five scab-infected lots had deoxynivalenol (DON) concentrations ranging from 0.64 to 5.10 ppm, and two lots were scabfree controls. Each lot was cleaned by four methods: 1) a normal, single cleaning to obtain maximum screenings with a minimum of wheat lost; 2) double cleaning using the normal flow; 3) single cleaning with suction increased on the millerator and the entoleter aspirator; and 4) single cleaning followed by washing the wheat with water. None of the cleaning methods completely removed DON, and the special methods showed little or no advantage over the normal, single cleaning. Cleaning efficiency varied with DON concentration among lots of cleaned wheats (means of four cleaning methods) ranging from 48 to 86% of that in uncleaned wheat. The cleaned wheats were milled with a Miag Multomat mill. All mill fractions from scab-infected wheat contained DON. Concentrations of DON were generally lower in flours, and higher in offals, than in the cleaned wheat. Average DON concentratation of straight-grade flour was 44 and 75% of that in uncleaned and cleaned wheat, respectively. DON was not destroyed by baking bread. Only bread from flours with highest levels of DON had slightly reduced loaf volumes and off-colours in bread crumb compared to controls. AA

2524 ANDERSON (DM), THACKER (PA), FENTON (M) and BOWLAND (JP). Chemical composition and nutritive value of dark hard and yellow hard kernels of Canadian Winter wheats (**Triticum aestivum** L.) fed to laboratory rats. **Cereal Chem. 63**(2); 1986; 75-7

Sixty Sprague-Dawley rats (initial weight 84 g) were randomly assigned to one of 10 treatments in a 21-days growth trial conducted to compare the nutritive value of light and dark kernels of Canadian winter wheats. The experimental diets for this growth trial contained the winter wheat cultivars Yogo, Sundance, Nugaines, Winalta, or Kharkov separated into kernels of light or dark colour by a density-gradient method. The diets contained 92.4% wheat, 7.0% vitamin-mineral premix, and 0.6% chromic oxide as a digestibility indicator. Digestibility coefficients for dry matter, energy, and protein were highest for the cultivar Winalta and lowest for the cultivar Sundance. Light-coloured kernels had a lower digestibility coefficient for dry matter and energy but a higher digestibility coefficient for protein in comparison with dark-coloured kernels. Average weight gain was higher for rats fed the cultivar Sundance (57.6 g) compared with Yogo (44.4 g), with the other cultivars producing intermediate gains.

There was no difference in feed conversion efficiency between wheat cultivars. Colour of kernel had no significant effect on weight gain, feed consumption, or feed conversion efficiency. AA

2525 KOBAYASHI (S), SCHWARTZ (SJ) and LINEBACK (DR). Comparison of the structures of amylopectins from different wheat varieties. **Cereal Chem. 63**(2); 1986; 71-4

Amylopectins from ten varieties (five classes) of wheat were isolated by high-performance size-exclusion chromatography (HPSEC). All ten purified amylopectin samples contained a single polysaccharide peak with similar retention time and peak shape. Debranching of each sample with isoamylase produced four linear carbohydrate components. HPSEC was useful in rapidly monitoring debranched fragments from amylopectins. The average degree of polymerization (DP) and proportion (percent of total peak areas) for each fragment was 86 (4.0), 39 (19.1), 19 (30.5), and 12 (46.4%), respectively. Calculated peak area [(DP 19 + DP 12)/DP 39] and 12 (46.4%),respectively. Calculated peak area [(DP 19 + DP 12)/DP 39] and molar ratios of debranched fragments were slightly higher than those previously reported. All wheat amylopectins studied were identical in their debranching patterns, indicating no detectable differences in their structure. AA

2526 LEI (M-G) and REECK (GR). Two dimensional electrophoretic analysis of wheat kernel proteins. **Cereal Chem. 63**(2); 1986; 111-6

By extraction or solubility in water, 0.5M NaCl, 70% ethanol or 1% sodium dodecyl sulphate (SDS)/2% 2-mercaptoethanol, wheat kernel proteins were fractionated and each fraction analysed by two-dimensional electrophoresis. For the first dimension, both isoelectric focussing and nonequilibrium pH gradient electrophoresis was used for the second dimension. Different electrophoretic patterns and distinct characteristics were observed in albumin and globulin fractions. Similar electrophoretic patterns were observed in alcohol extracted proteins and SDS extracted proteins. About 300 spots in the water-or-salt extracted proteins and about 180 spots in the water- and salt non extracted proteins were resolved. In the light of these results, nomenclature of wheat kernel proteins has been discussed. BSN

2527 LEI (M-G) and REECK (GR). Two dimensional electrophoretic analysis of kernel proteins of triticales and of their parental durum wheats and ryes. **Cereal Chem. 63**(2); 1986; 116-23

The proteins in two triticale lines and their parallel lines of wheat (Triticum durum) and rye (Secale cereale) were examined by two-dimensional electrophoresis, with non equilibrium pH, gradient electrophoresis in the first dimension and sodium dodecyl sulphate slab gel in the second dimension. Kernel proteins were fractionated by extraction with water 0.5 M NaCl and 1% sodium dodecyl sulphate/2% mercaptoethanol. Triticale protein fractions showed similar, but not identical electrophorograms corresponding to the electrophoregrams of the commbined fractions of the two parents. Quantitative, as well as qualitative differences between polypeptides of triticales and their parental durum wheats were observed. BSN

2528 KATSARIS (M). Production of a wheat flour with a high vitamin content. **Getreide Mehl Brot. 39**(12); 1985; 368-9 (German)

After many years of experience in Greek mills, the author is now in a position to describe how wheat flour with a high vitamin content may be manufactured. Such a flour is made with a normal white flour to which feed flour and residual flour have been added. This 85% type of flour can be produced in every mill. KMD

2529 DEVAUX (MF), BERTRAND (D) and MARTIN (G). Discrimination of bread baking quality of wheats according to their variety of near-infrared

reflectance spectroscopy., **Cereal Chem. 63(2); 1986; 151-4**

Assessment of the bread-baking quality of French soft wheat by near-infrared reflectance (NIR) spectroscopy, using standard mathematical treatments and reference tests, has had limited success. New mathematical treatments of NIR spectra are reported that assign a technological value to wheat varieties to differentiate potential bread-baking quality categories. The seven most cultivated soft wheat varieties in France were chosen for this study Two preliminary mathematical treatments were applied to reduce the number of spectral data (351 wavelengths, without loss of information. These were fast Fourier transform and principal component analysis of the Fourier coefficients. By these methods, the log (I/R) spectral values were transformed to 10 independent synthetic variables that were subsequently treated by multiple discriminant anlaysis. The first mathematical treatment was made to discriminate and recognize the seven varieties, and 74% of unknown samples were identified (79 samples for calibration and 42 for prediction). The two varieties that were principally confused (Fidel and Talent) were of the same bread-baking quality. The second mathematical treatment concerned three bread-baking categories: good, unsuitable, and irregular. Correct category assignments were made for 95% of unknown samples. Advantages of those mathematical methods are discussed. AA

2530 BOLLING (H), MUNZING (K) and GERSTENKORN (P). Soundness of wheat in relation to storage conditions. **Getreide Mehl Brot. 39(12); 1985; 361-8** (German)

2531 JOIA (BS), LOSCHIAVO (SR) and WEBSTER (GRB). Cypermethrin and fenvalerate as grain protectants against **Tribolium castaneum** (Coleoptera: Tenebrionidae) and **Cryptolestes ferrugineus** (Coleptera: Cucujidae) at different moisture levels and temperatures. **J. Econ. Entomol. 78(3); 1985; 637-41**

Cypermethrin and fenvalerate were applied at 8 and 12 mg/kg to wheat of 13.3 and 15.0% moisture content. Treated wheat was stored at 25 and -5 C for 60-weeks. Cypermethrin to be effective against both species under all storage conditions. Fenvalerate caused only 33% mortality of **C. ferrugineus**. At the two moisture contents, fenvalerate caused 63.3 to 66.7% initial mortality of T. **castaneum** at 8 mg/kg and 90 to 100% at 12 mg/kg. KAR

2532 CHERIF (R), LEESCH (J) and DAVIS (R). Effect of temperature on the efficiency of methyl bromide against adults of **Sitophilus granarius** (L.) (Coleoptera: Curculionidae) on soft and hard wheats. **J. Econ. Entomol. 78(3); 1985; 660-65**

Toxicity of methyl bromide gas to **Sitophilus granarius** (L.) adults in 'Soft Red Winter' wheat (SW) and 'Hard Red Winter' wheat (HW) was tested at three different temperature (26, 15 and 5 C). Temperature and toxicity of methyl bromide were negatively correlated. LD_{50}s at 26, 15, and 5 C for SW and HW increased by 20 and 14% as the temperature decreased from 26 to 15 C and 29 and 44% from 15 to 5 C, respectively. The efficacy of the fumigant on **S. granarius** was influenced by the type of wheat. Methyl bromide was more effective in HW than in SW when both were tested under the same conditions. The SW sorbed more methyl bromide than HW irrespective of the temperature and the presence or absence of insects. Methyl bromide sorption decreased as the temperature decreased from 26 to 15 C and the difference in sorption between the SW and HW increased as the temperature decreased from 26 to 5 C. AA

2533 WARCHALEWSKI (JR), KLOCKIEWICZ-KAMINSKA (E) and MADAJ (D). Changes in α-amylases activity in wheat and malted wheat grain after long storage. **Acta Aliment. Polonica. 11(25)(4); 1985; 379-84**

2534 NIERLE (W) and EL BAYA (AW). Influence of protein-lipid complexes on the baking performance of wheat. **Getreide Mehl Brot. 39**(11); 1985; 337-40 (German)

When neutral lipids are extracted from flours of various grades, the baked volume of the flours increases. This effect is more pronounced in weak flours than in strong flours. Interchange of the extracted lipids produces only a slight increase in volume. Soya lecithin- depending on the concentration used increases the baking quality distinctly; but when used in small amounts it has a slightly negative effect on the increase in volume of strong flours. Gliadin, with its high polar lipid content, is a very powerful improver, while glutenin, which contains non-polar lipids, has a negative effect. The positive action of gliadin can be obtained also with an extract of vital gluten in 70% alcohol. The action of alcoholic extracts of gluten is proportionate to their lipid content, even though their protein compositions may be nearly identical. Addition of gliadin extract does not produce a result that is as favourable as that obtained by addition of gliadin; on the other hand, the protein component, without lipid, has a strongly negative effect. KMD

2535 RIZK (SW) and CLYDESDALE (FM). Effectiveness of organic acids to solubilize iron from a wheat-soy drink. **J. Food Prot. 48**(8); 1985; 648-52, 658

Changes in the chemical iron profile of a wheat protein concentrate-soy (WPC-Soy) drink resulting from organic acid (ligand) and iron fortification were examined. The ability of each ligand to enhance iron solubility in a WPC-Soy blend was dependent upon both pH and iron source added. Using an 8:1 molar ratio of ligand:iron, the greatest increases in percent soluble iron occurred with ascorbic acid and cysteine at pH 2, ascorbic acid at pH 4, and citric acid at pH 6. Electrolytic reduced iron (ERFe) was considered to be the most suitable iron fortificant (1:1 ratio of exogenous:endogenous iron) for this food on the basis of both iron solubility and technological feasibility. Supplementation of the WPC-Soy blend with ERFe and ascorbic or citric acid was shown to provide the greatest potential for improving iron availability in man as measured by chemical means. AA

MILLETS

Maize

2536 WATSON (SA) and HERUM (FL). Comparison of eight devices for measuring breakage susceptibility of shelled corn. **Cereal Chem. 63**(2); 1986; 139-42

Eight instruments developed for evaluating breakage susceptibility of corn under commercial conditions were compared in several collaborative studies. Six of the devices subjected the shelled corn to impact against a hard surface, which is thought to most closely simulate the damaging stresses that occur in commercial handlig of corn. The kernels were subjected to impact velocities of 18-31 m/sec. The Stein breakage tester (SBT) and as SBT modified by increasing the impeller diameter by 24% subjected the kernels to a combination of impact and abrasion. Screening the corn samples passed through the impact devices indicated 41-68% more broken material with a 6.35 mm sieve (16/64-in) than a 4.76 mm sieve (12/64 in), whereas discharge from the standard SBT showed only an 8% increase, indicating a significant difference in types of breakage produced. The best precision, indicated by low coefficients of variability, was shown in all tests by the device developed at the University of Wisconsin. It had the fastest throughput time (600 g/min) and a study and patentable design.

This device was selected for further study and development. AA

2537 MAGA (JA) and FAPOJUWO (OO). Extrusion of corn grits containing various levels of hydrocolloids. **J. Food Technol.** 21(1); 1986; 61-6

2538 DI PENTIMA (JH), GUEMES (DR) and IGLESIAS (AF). Precooling of sweet corn (**Zea mays** L.) **Rev. Agroquim. Tecnol. Aliment.** 25(4); 1985; 559-64 (Spanish)

2539 KNUTSON (CA). A simplified colorimetric procedure for determination of amylose in maize starches. **Cereal Chem.** 63(2); 1986; 89-92

When iodine is dissolved in mixtures of water and dimethylsulphoxide (Me_2SO), triiodide ion is formed; the extent of triiodide formation is dependent upon the proportion of Me_2SO in the mixture. A method has been developed to utilize this reaction to form the blue amylose-iodine complex, providing a simple procedure for quantitative measurement of amylose in starches. Starch is dissolved in a mixture of 90% Me_2SO and 10% water containing iodine. Upon dissolution of the starch, the mixture is diluted with water to give a final Me_2SO concentration of 10%, whereupon the blue amylose-iodine complex forms immediately. Amylose is then determined by measurement of the absorbance of the complex at 600 nm. Use of Me_2SO to generate triiodide ion eliminates the necessity for preparing buffered solutions of iodine in potassium iodide. Accuracy and sensitivity of the procedure is equivalent to that of the conventional methods of preparing the amylose-iodine complex. AA

2540 FORNAL (J). Influence of hydrothermal treatment on the starch of corn grain. **Acta Aliment. Polonica.** 11(23)(1); 1985; 141-51

2541 LEE (S-J), HANNA (MA) and BULLERMAN (LB). Carbon dioxide and aflatoxin production in high-moisture corn treated with potassium sorbate. **Cereal Chem.** 63(2); 1986; 82-5

Potassium sorbate was evaluated as a potential preservative for storage of whole kernel yellow dent corn containing 18, 24 and 30% moisture. Growth of pure cultures of **Aspergillus parasiticus** NRRL 2999 and **Fusarium roseum (graminearum)** Mapleton-10 inoculated onto sterile autoclaved corn were monitored by visual observation of mycelial development and carbon dioxide (CO_2) production. Mycotoxin production by the pure cultures was also measured. In general, mycotoxin and CO_2 production were reduced with increasing levels of sorbate. However, samples treated with 0.5% sorbate and inoculated with **A. parasiticus** contained about the same amount of aflatoxin as the control at the end of incubation period. The sorbate was more effective on corn with lower moisture content and in sealed containers, where high concentrations of CO_2 accumulated during incubation. Growth of **F. roseum** was completely inhibited by 0.5% sorbate. AA

2542 EL-BAHRAWY (A), HART (LP) and PESTKA (JJ). Comparison of deoxynivalenol (vomitoxin) production by **Fusarium graminearum** isolates in corn steep supplemented fries medium. **J. Food Prot.** 48(8); 1985; 705-8

Four out of nine North American **Fusarium graminearum** isolates produced deoxynivalenol (DON) and 15-monoacetyl deoxynivalenol (15-ADON) when grown in stationary cultures of modified Fries medium supplemented with 4% corn steep liquor. Strains R-6576, Van Wert A-1 and Stuckey produced primarily DON after 20 days of incubation at 28 C. In these strains, low levels of 15-ADON accumulated after 5 days but then declined over time. Disappearance of 15-ADON and subsequent appearance of DON coincided with both a rapid rise of pH and above 8.0 and onset of the stationary phase. DON levels peaked after the exhaustion of carbohydrate (day 20) and then began to decline. In contrast to these three strains, strain NRRL 5883 produced primarily

15-ADON during an extended growth phase (day 10) and only small amounts of DON during late stationary phase (day 25). NRRL 5883 exhibited a slow rise in pH relative to the other three strains and utilized only 75% of the available carbohydrate during the 25-days period. Qualitative and quantitative production of DON and 15-ADON in liquid culture was dependent on the strain of **F. graminearum**. AA

Proso millet

2543 YANEZ (GA) and WALKER (CE). Effect of tempering parameters on extraction and ash of proso millet flours, and partial characterization of proso starch. **Cereal Chem. 63**(2); 1986; 164-7

Sorghum

2544 HASSEN (MM), MERTZ (ET), KIRLEIS (AW), EJETA (G), AXTELL (JD) and VILLEGAS (E). Tryptophan levels in normal and high-lysine sorghums. **Cereal Chem. 63**(2); 1986; 175-6

PULSES

Kidney beans

2545 KERMASHA (S), VOORT (FR Van de) and METCHE (M). Characterization of French bean (**Phaseolus vulgaris**) seed lipase. **Can. Inst. Food Sci. Technol. J. 19**(1); 1986; 23-7

Crude lipase was extracted from defatted ground French bean seeds using 1 x 10^{-3} M $CaCl_2$ in combination with ultrasound disruption and further purified with ammonium sulphate at 60% of saturation. The additional use of ammonium sulphate doubled the crude lipase activity, while the combination of ultrasound and ammonium sulphate increased the activity by a factor of six. The effects of pH, calcium ion concentration and the addition of an emulsifying agent were also investigated. The opptimum pH was determined to be near 7, and the addition of calcium ion beyond the concentration present in the extract had an inhibitor effect on the activity, whereas the addition of Tween-20 increased the activity of the enzyme by a factor of four. The specificity of French bean lipase, relative to pancreatic lipase, was studied using triacetin, olive oil and French bean lipid as substrates. The crude lipase fraction obtained from the French bean seed had a higher activity than pancreatic lipase and it also exhibited notable carboxylesterase activity. AA

2546 JACOB (RJ) and PATTABIRAMAN (TN). Natural plant enzyme inhibitors: Isolation and properties of a tryosin/chymotrypsin inhibitor from kidney bean (**Phaseolus vulgaris**). **Indian J. Biochem. Biophys. 23**(2); 1986; 105-9

A trypsin/chymotrypsin, double-headed inhibitor was isolated from kidney bean (**Phaseolus vulgaris**) by extraction in neutral medium and chromatographies on DEAE-cellulose and trypsin-Affigel-10. The protein with an M_r of 13 K, inhibited bovine trypsin non-competitively (K_i 6.4 x 10^{-8} M) and bovine α-chymotrypsin uncompetitively (K_i 1.35 x 10^{-7} M). Formation of trypsin-inhibitor-chymotrypsin trimer complex was demonstrated by chromatography on Sephadex G-100. The antichymotryptic activity of the factor was more stable to heat and to inactivation by trinitrobenzene sulphonate than the antitryptic activity. The inhibitor was resistant to pepsin action. AA

Lentils

2547 BHATTY (RS). Protein subunits and amino acid composition of wild lentil. **Phytochemistry.** 25(3); 1986; 641-4

Locust beans

2548 FISZMAN (SM), COSTELL (E) and DURAN (L). Compression behaviour of kappa-carrageenan gels. Effects of addition of iota-carrageenan and locust bean gum. **Rev. Agroquim. Tecnol. Aliment.** 25(4); 1985; 591-8 (Spanish)

Peas

2549 POMPEI (C) and RIVA (M). Development of a system for quality assessment and representation and its application to canned peas. **Industria Conserve.** 60(4); 1985; 310-18 (Italian)

Prosopis glandulosa

2550 ZOLFAGHARI (R), HARDEN (M) and HUFFMAN (L). Some physical and chemical properties of honey mesquite pod (**Prosopis glandulosa**) and applications in food products. **Cereal Chem.** 63(2); 1986; 104-8

Winged beans

2551 AMIT ROY and MANORANJAN SINGH. Purification of a storage protein of **Psophocarpus tetragonolobus. Phytochemistry.** 25(3); 1986; 595-600

OILSEEDS AND NUTS

Cottonseeds

2552 DEL VALLE (FR), ESCOBEDO (M), RAMOS (P), DE SANTIAGO (S), BOURGES (H), RHEE (KC), CHOI (YR), VEGA (M) and PONCE (J). Evaluation of extrusion cooked cottonseed/soyabean blends of different proportions. **J. Food Process. Preserv.** 9(1); 1985; 35-41

Cottonseed kernel/full-fat soy flour blends of different proportions were cooked in a Brady low-cost extruder. Total and free gossypol, available lysine, proximate analysis, and PER and NPU values varied directly with composition. Reduction in free gossypol as a result of extrusion was constant, and independent of composition (ca. 90%). The 25 and 50% cottonseed blends exhibited low free gossypol (within limits permitted for human consumption), high available lysine, higher PER and NPU values, and amino acid patterns equalling or exceeding the FAO/WHO (1973) children's pattern, except for moderate deficiencies in total sulphur amino acids and small to negligible deficiencies in valine. Both blends resembled full-fat soy products in proximate analysis. These results indicate that extension of soy with cottonseed products upto a level of 50%, utilizing the procedure described in this work, would be feasible. AA

2553 EHRLICH (KC), DeLUCCA (AJ) II and CIEGLER (A). Naphtho- -pyrone production by **Aspergillus niger** isolated from stored cottonseed. **Appl. Environ. Microbiol.** 48(1); 1984; 1-4

Olives

2554 TANTAOUI-ELARAKI (A) and TUTOUR (BLE). Possible mycotoxin contamination of olives and olive products: Latest developments. **Oleagineux.**

40(8,9); 1985; 451-4 (French)

Mycological analyses have shown that molds from the genus **Penicillium** are the most frequent on olives and olive products, followed by **Aspergillus. Aspergillus flavus** and **A. ochraceus** strains have been isolated; some of them have been shown to produce high amounts of Aflatoxin B1 or Ochratoxin A, respectively. But, toxigenesis has always been weak on olives. However, aflatoxin B1 or Ochratoxin A have been found in commercial samples of edible olives or olive oil. The authors make the conclusion that olives and olive products may be contaminated with those two mycotoxins. AA

Palms

2555 KERSHAW (SJ) and HARDWICK (JF). Some aspects of the commercial contractual analysis of palm kernels. **Oleagineux. 40**(7); 1985; 397-403

The palm kernel is a well-established commercial oilseed crop. This study reports on its commercial contractual analysis. Oil contents of separate parcels from the same geographical origin are similar, whereas free fatty acids in oil and shell and dirt contents show wider variation. Individual kernels making up single contractual analysis samples show some degreee of heterogeneity in their individual analysis for oil and free fatty acids in oil but current test methods give excellent reproducibility if careful sub-sampling procedures are followed. AA

Rapeseeds

2556 THOMAS (A) and BRUCK (CG). Demands of food industry on new rapeseed varieties. **Fette Seifen Anstrichm. 87**(11); 1985; 460-63 (German)

Regarding the well-known possibilities of realization in practice the demand of food and feed industry, concerning new rape seed varieties can be ranked by priority as follows: decrease of the glycosinolate content to maximal 18 µmol glucosinolate/g seed, high thousand grain weight, thin/yellow hull, alteration of the linolenic acid content and the linoleic acid content to maximal 3% or minimal 30%; decrease of sinapin content. These breeding objectives are explained. AA

Sesame

2557 DJIGMA (A). Synthesis of results acquired from research into sesame in Burkina Faso. **Oleagineux. 40**(8,9); 1985; 443-9 (French)

Soybeans

2558 SHROFF (VN), KARANJKAR (SV) and PANDYA (SC). Perspectives of soyabean production. **Poult. Guide. 23**(4); 1986; 37-43

2559 BHANDARI (VG). Some improvements in soya processing in India. **Poult. Guide. 23**(4); 1986; 44-8

2560 BUSHMAN (DH). Advances in feeding soyabean products. **Poult. Guide. 23**(4); 1986; 21-36

2561 SHEARD (PR), FELLOWS (A), LEDWARD (DA) and MITCHELL (JR). Macromolecular changes associated with the heat treatment of soya isolate. **J. Food Technol. 21**(1); 1986; 55-60

The denaturation temperatures of both the 7S and 11S proteins present in a 70 PDI soy flour and an isolate prepared from it, increased by over 30 C as the water content of the system decreased from 90 to 20%. In dilute dispersions (> 70% water), the precipitate formed on heat treatment was almost totally soluble in 3.0% sodium

dodecyl sulphate (SDS), irrespective of the heating temperature (20-120 C). However, in more concentrated systems, heat treatment at 120 C for 1 hour caused increasing amounts of SDS insoluble protein to form as the water content decreased. Such aggregates were also insoluble in beta-mercaptoethanol (ME), but soluble in mixtures of SDS plus ME. AA

2562 LOWE (CM), KOTULA (KT) and BRIGGS (GM). The protein quality (PER and NPR) of several powdered soybean protein food products in the rat. **Nutr. Rep. Int. 32(3); 1985; 547-57**

2563 MOHD NASIM, MITAL (BK) and TYAGI (SM). Development of a process for preparation of soy paneer. **J. Food Sci, Technol. (India) 23**(2); 1986; 69-72

Processing conditions for preparing soy paneer such as level of soy dal to water (levels used 100, 135, and 170 g of dal/l water), for extraction, total solids content in soy milk, coagulation temperature (65, 75 and 85 C were used) and concentration of coagulant were standardised. Lactic acid, tartaric acid and citric acid (each at 1.0, 2.0 and 3.0% level) and gluconic acid (1.0, 1.3 and 1.6% level) were used as coagulant. Maximum extraction of TS (55%) and proteins (62.7%) was when dal to water ratio was at 1:10. Citric acid gave maximum yield with high content of TS (25.60 - 28.00%) and protein (15.31 - 16.37%) in the product compared to tartaric acid, lactic acid and gluconic acid. Soy paneer prepared by citric acid had 74.0% moisture, 15.5% protein and 3.9% fat. The product possessed fragile texture. Citric acid at 2% gave a product with highest acceptability score. Fried soy paneer resembled milk paneer in taste, colour and sponginess. Consumer preference trails with 150 families indicated that the product was highly acceptable. KAR

Sunflowers

2564 BUENDIA (MO) and D'APPOLONIA (BL). Storage studies on confectionery sunflower kernels. **Cereal Chem. 63**(2); 1986; 85-8

Coconuts

2565 JAYALEKSHMY (A), NARAYANAN (CS), MATHEW (AG) and MADHUSUDANAN (KP). Basic fraction of volatile constituents from roasted coconut. **Food Sci. + Technol. 18(6); 1985; 350-52**

Mature coconuts were cut, grated, dried and roasted at 160 C. The basic fraction of the coconut flavour concentrate had an earthy, raw and green smell, characteristic of alkyl- and alkoxy pyrazines. GLC and GC-MS analyses showed the presence of 13 pyrazines and 1 furan. AA

Sweet almonds

2566 ARYA (SS) and MADHURA (CV). Benzaldehyde as a measure of bitter kernels in sweet almonds. **J. Food Sci. Technol. (India) 23**(2); 1986; 100-101

Benzaldehyde in sweet and bitter almonds was determined by colorimetry and UV spectrophotometric methods to find the relation if any, between bitterness of almonds and concentration of benzaldehyde. Concentration of benzaldehyde in sweet almonds was < 0.15 mg/100 g, but when admixed with 1% of bitter kernels, it increased to 13.5 - 14.0 mg/100 g. Among the two methods, UV spectrophotometric method is more sensitive and relatively free from interferences from other carbonyls. Benzaldehyde in better almonds is produced by the hydrolysis of amygdalin by the naturally occurring glucosidase emulsion. This hydrolysis is complete in 1 hour at 37 C and 1.5 hour at 32 C when

powdered sample of bitter almonds is incubated with water. KAR

TUBERS AND VEGETABLES

2567 ABO BAKR (TM), EL-IRAQUI (SM) and HUISSEN (MH). Nitrate and nitrite contents of some fresh and processed Egyptian vegetables. **Food Chem.** 19(4); 1986; 265-75

Nitrate content was highest in leafy vegetables, followed by root vegetables and then pulses. Nitrite concentrations were detected at low levels in a few samples, while the others were free of nitrite. Cooking lowered the levels of nitrate in all types of fresh vegetables, no nitrite was formed during cooking. Storage of frozen vegetables for 6 months decreased the levels of nitrate, while nitrite was formed at low levels after storage for 3 or 4 months. KAR

Allium

2568 FENWICK (GR) and HANLEY (AB). The genus Allium. Part 2. **CRC Crit. Rev. Food Sci. Nutr.** 22(4); 1985; 273-377

2569 FENWICK (GR) and HANLEY (AB). The genus Allium. Part 3. **CRC Crit. Rev. Food Sci. Nutr.** 23(1); 1985; 1-73

Onions

2570 THOMAS (P), PADWAL-DESAI (SR), SRIRANGARAJAN (AN), JOSHI (MR), JANAVE (MT), BHONDE (SR) and QADRI (SMH). Pilot-scale storage tests on the efficacy of gamma irradiation for sprout inhibition of onions under commercial storage conditions. **J. Food Sci. Technol. (India)** 23(2); 1980; 79-84

Storage trials of onions were carried out in 1981 with Nasik Red var., Rabi season crop (April to May) and N-53 var., Rangda crop (January-March) in 1982 by storing in traditional storage shed (Chawl) and a model store built by National Agricultural Co-operative Marketing Federation of India (NAFED) as such and after gamma irradiation with a dose of 60 Gy. Losses of 70% occurred due to sprouting (17%), rotting (25%) and desiccation (28%) in Rabi crop when stored in chawl over a period of 4-5 months. Storage in NAFED model store reduced this to 50% mostly due to reduction in microbial spoilage. Sprouting and rottings were lower in Rangda onions, as compared to Rabi onions. Irradiation completely suppressed sprouting in Rabi and Rangda onions regardless of time of irradiation i.e. two or three weeks after harvest. In Rabi onions, storage of irradiated onions in model store increased the marketable surplus by 20% at the end of 4.5 months, while in the chawl no beneficial effect was observed. In both the storages, bacterial soft rot was more in irradiated bulbs, whereas black mold predominated in non-irradiated bulbs. DM, soluble solids, reducing sugars, colour, pungency and flavour strength were not affected by irradiation, though an internal discolouration limited to a very small area was seen due to the dead meristem or internal sprouts. KAR

Carrots

2571 KONNO (H), YAMASAKI (Y) and KATOH (K). Enzymatic degradation of pectin substances and cell walls purified from carrot cell cultures. **Phytochemistry.** 25(3); 1986; 623-7

Cassava

2572 RAIMBAULT (M), REVAH (S), PINA (F) and VILLALOBOS (P). Protein enrichment of cassava by solid substrate fermentation using molds isolated from traditional foods. **J. Ferment. Technol. 63**(4); 1985; 395-9

Initially 24 models were screened by liquid cultivation to select those which produced high protein levels with good conversion rates. Then protein enrichment of cassava from 18 selected strains by solid substrate fermentation upgraded final protein contents of formulated products between 10 and 16.5%. Essentially **Asp.** sp strains gave the best results. KAR

Potatoes

2573 RODEHED (C), RANBY (B), BAYONA (M) and MEHROTRA (R). Morphological studies of potato starch modified by grafting using Mn^{3+} as initiator and by saponification. **Starch. 37**(11); 1985; 367-72

2574 LESZCZYNSKI (W). Properties of potato starch saturated with ferric salts. **Acta Aliment. Polonica. 11**(25)(1); 1985; 21-34

2575 BORUCH (M). Physico-chemical modification of potato starch with different grain size. **Acta Aliment. Polonica. 11**(25)(1); 1985; 43-51

2576 GOLACHOWSKI (A) and LESZCZYNSKI (W). Method for determination of potato starch reducing properties. **Acta Aliment. Polonica. 11**(25)(1); 1985; 125-32

2577 REISTAD (R) and HAGEN (BF). Dietary fibre in raw and cooked potatoes. **Food Chem. 19**(3); 1986; 189-96

Cooking of potatoes resulted in a higher content of insoluble DF. Cooked potatoes showed approximately the same content of DF whether before or after cooking, boiled in water or steam boiled. KAR

2578 BERRY (SK), KULKARNI (SG), SEHGAL (RC), SUKHIR KAUR and KALRA (CL). Studies on the utilization of post cold-stored potatoes in the preparation of potato-besan Sevian. **Indian Food Packer. 40**(2); 1980; 42-9

Traditionally, deep fat fried salted and spiced sevian (Murku, seb) are prepared from 'Besan' (Bengal gram flour). A recipe containing boiled potatoes admixed with besan, salt and spices has been developed to manufacture of potato sevian. The product was examined for physico-chemical and organoleptic changes during 6-month storage at room temperature (13-38 C, RH 30-90%). The product has initial moisture content of 2.1% (RH 25.7%) which rose to 7.6% at the end of six months. The peroxide value of the product increased from nil to 759 meq O2/kg. oil during storage. The product had an excellent organoleptic appeal in respect of colour, texture, taste and overall flavour. The product was found acceptable only upto three months of storage at room temperature (13-38 C, RH 30-90%). Deep fat fried sevian packed in 150 gauge low density polyethylene bags remained crisp and were found to be acceptable upto 3 months of storage. The product stored still better in friction-top-tins. AA

Amaranth

2579 PANT (KC). Effect of heat processing (popping) on protein nutritional quality of grain amaranth. **Nutr. Rep. Int. 32**(5); 1985; 1089-98

Popping did not affect the proximate composition of the grain, but there was significant loss of total lysine content of the protein of the popped grain. This was more in home popped grains (36%) than in commercially-popped grains. The net protein ratio of home-popped amar-

anth·grain was consistently lower compound to that of commercially popped grain. Addition of 0.25% lysine monohydrochloride to the home popped grains did not improve this NPR, thus indicating that well popped grains do not suffer any deterioration in protein quality as measured by the net protein ratio. KAR

Dandelions

2580 KUUSI (T) and AUTIO (K). The Bitterness properties of Dandelion. I. Sensory investigations. **Food Sci. + Technol.** 18(6); 1985; 339-46

The degree of bitterness, and the factors influencing it, were investigated in 69 named, Finnish agamo species of dandelion (**Taraxacum**), two commercial salad-dandelion varieties, and for comparison - in salad chicory (**Cichorium intybus**). The bitterness of extracts was measured by sensory evaluation, on a scale 0-6, where the score 3 was anchored with a 0.015% quinine standard. The bitterness of salad chicory leaves was put at 4.9 on the scale, while that of dandelion varied between 1 and 5. The bitterness was attributed to a quinine-like component and a dandelion-like component. KMD

2581 KUUSI (T), PYSSALO (H) and AUTIO (K). The bitterness principles. II. Chemical investigations. **Food Sci. + Technol.** 18(6); 1986; 347-9

A mixture of water and ethanol was used to extract 4 bitter compounds from dandelion leaves, viz. p-hydroxyphenylacetic acid, β-sitosterol, taraxine acid-1'-O-B-D-glucopyranoside, and 11,13-dihydrotaraxine acid-1'O-B-D-glucopyranoside. The compounds were comparatively stable. Their bitterness was slightly decreased by heating, acidity, and oxidants, and effectively decreased by strong acids and alkalis. The bitterness of the roots was considerably reduced by drying. Hence, one can now develop new taste combinations for different purposes. Studies may now be conducted on the type of bitterness and other sensory properties. KMD

Tomatoes

2582 OTTENEDER (H). Evaluation of tomato pulp and tomato ketch-up by chemical analysis. **Dtsch. Lebensmittel-Rundsch.** 82(1); 1986; 14-8 (German)

Tests were conducted on 63 samples of tomatoes harvested between 1975 and 1982 in countries that are the most important suppliers of tomatoes to Europe. A procedure has been suggested to compute the proportion of tomato solids (or dry matter) in ketchup. The method is based on the characteristic values obtained for formaldehyde solution, potassium, citric acid, L-glutamic acid, nitrogen, and lycopene. Comparison values were weighted, using factors that were calculated according to mathematical-statistical methods. KMD

FRUITS

Apples

2583 GIANFAGNA (TJ) and BERKOWITZ (GA). Glucose catabolism and anthocyanin production in apple fruit. **Phytochemistry.** 25(3); 1986; 607-9

2584 CUNNINGHAM (DG), ACREE (TE), BARNARD (J), BUTTS (RM) and BRAELL (PA). Charm analaysis of apple volatiles. **Food Chem.** 19(2); 1986; 137-47

Charm analysis (where the odour activity is quantitatively associated with each component in a sample) was applied to several apple varieties which gave almost identical charm responses. However, no two cultivars showed close resemblance by the technique. Charm response can be used together with physical parameters, to describe

apple flavour. KAR

2585 LAL KAUSHAL (BB) and ANAND (JC). Recent trials on grading and packaging of apples. **Indian Food Packer. 40**(2); 1986; 29-30

Aspects covered include, sorting and grading of apples; packaging; corrugated fibreboard (CFB) cartons; and comparison of CFB cartons with conventional wooden box. BSN

2586 HAN (DS), HWANG (IY), PARK (KH) and SHIN (HK). Modified atmosphere storage of Fuji apples in polyethylene films. **Food Sci. + Technol. 18**(6); 1985; 335-8

Fuji apples were sealed in bags of polyethylene (PE) film of varying thickness - 0.02, 0.03, 0.04 or 0.06 mm - and stored for 5 months at different temperatures between 0 and 7 C. The atmospheres in the PE bags were modified during the storage period to 5.4 - 19.5% O_2, with 0.8-4.5% CO_2, depending on film thickness. Storage in PE bags effectively reduced weight loss and decay occurrence, but resulted in a slightly higher internal browning than in non-packed storage. Decrease in the firmness of stored apples is shown to be related to changes in the polygalacturonase and cellulase activities. Intracellular space also increased with storate time. Fruits packed in 0.03 mm thick PE film obtained the highest sensory scores; in bags made of 0.03 mm - thick PE, the O_2 concentration fell to about 15.5%, while the CO_2 concentration increased to 2.4%. KMD

2587 BOLIN (HR) and JACKSON (R). Factors affecting sulphur dioxide binding in dried apples and apricots. **J. Food Process. Preserv. 9**(1); 1985; 25-34

The effect of sulphuring on bisulphite binding in apricots and apples was determined. Sulphuring methods had no effect on binding. Dehydration resulted in less conversion of the sulphur dioxide to the sulphate. An oxygen scanvenger added to the packaged dried apricots reduced both the rate of sulphur dioxide conversion to sulphate and the total sulphur dioxide loss, resulting in the product remaining lighter in colour for a longer time. In resulphuring, a progressively larger percentage of the added sulphur dioxide was bound as the storage time before resulphuring increased. The pH effect on sulphur dioxide binding was different in model solutions than in particulate fruit. In the former, there appeared to be a direct relationship to bisulphite dissociation but not in the latter. AA

Apricots

2588 CHAMBROY (Y) and FLANZY (C). Anaerobic metabolism of the apricot. **Fruits. 40**(11); 1985; 745-8 (French)

Fully ripe apricots fruits, belonging to the cultivars Rouge de Roussillon and Bergeron, were stored in the dark at 30 C, in glass jars filled with CO_2. The kinetics of CO_2 emission and the evolution of various substrates were measured over a period of 8 days. Similarities were observed between the anaerobic metabolisms of apricots and grapes, e.g. ethanol production and malate catabolism. Exploitation of this technique on an industrial scale is under study. KMD

2589 ABD EL-AAL (MH), HAMZA (MA) and RAHMA (EH). **In vitro** digestibility, physicochemical and functional properties of apricot kernel proteins. **Food Chem. 19**(3); 1986; 197-211

The study was conducted to remove the toxic material from apricot kernels. The physicochemical properties, digestibility by different enzyme systems and functional properties of the amygdalin-free apricot kernel flour and protein isolates were studied. KAR

2590 SOUTY (M), CHAMBROY (Y), JACQUEMIN (G), REICH (M) and BREUILS (L). Stabilization of apricots after harvesting. **Fruits. 40**(12); 1985; 813-7 (French)

Apricots undergo a rapid physiological evolution after harvest, and so it is difficult to place apricots of good organoleptic quality on the market. The authors have shown that a prior treatment with CO_2, or "CO_2 shock", can slow down the metabolism of these fruits. Use of this technique may be considered for the stabilization of other species of fruits also. KMD

Bananas

2591 DICK (E) and MARCELLIN (P). Effects of elevated temperatures on the evolution of bananas after harvesting. Prophylactic tests. **Fruits. 40**(12); 1985; 781-4 (French)

2592 PORRES (Ede), ARRIOLA (MCde), GARCIA (R) and ROLZ (C). Lactic acid fermentation of banana puree. **Food Sci. + Technol. 18**(6); 1985; 379-82

To utilize part of the considerable amounts of surplus fresh banana available in Central America, a fermentation process was developed to preserve the banana puree by lactic acid bacteria, that could be implemented by cooperatives in rural areas. Enzymatic browning of the ripe, peeled fruit was prevented by a 7 minute blanch in boiling water before pulping. One % milk solids and 1% lactic bacteria inoculum were then added to the puree. From 16 lactic bacteria strains studied, 4: **L. plantarum, L. casei, L. fumentum** and **L. cellobiosus**, which reduced pH below 4.5 in 24 hours were selected for their ability to reduce pH in a short time and produce an acceptable flavour. After this time, fermentation must be stopped by heating or refrigeration because of flavour deterioration. A strain of **L. plantarum** gave best results. The fermented puree is suitable for banana-flavoured specialty foods. AA

2593 IIZUKA (M), UENAKAI (K), SVENDSBY (O) and YAMAMOTO (T). Alcohol fermentation of green banana. **J. Ferment. Technol. 63**(5); 1985; 475-7

This paper reports that heating of green (immature) banana fingers at around 80 C for 30 minutes greatly improves the digestibility of the banana starch by glucoamylase and results in good alcohol fermentation by yeast. The addition of pectic enzymes accelerates the alcohol fermentation. AA

Citrus fruits

2594 KHAN (AJ), KUNESCH (G), CHUILON (S) and RAVISE (A). Structure and biological activity of xanthyletin a new phytoalexin of citrus. **Fruits. 40**(12); 1985; 807-11 (French)

Xanthyletin, a coumarin, has been isolated from tissues of citrus infected by **Phytophthora** spp. This compound is identified by infra red, mass spectrometry and nuclear magnetic resonance data. It is an efficient inhibitor of **Phytophthora citrophthora in vitro** and a synergistic effect is observed with other phenolics of citrus. AA

2595 SHOMER (I), LINDNER (P), VASILIVER (R), KANNER (J) and MERIN (U). Colloidal fractions of citrus fruit aqueous peel extract. **Food Sci. + Technol. 18**(6); 1986; 357-65

The insoluble colloidal fractions of citrus peel extracts have been characterized in order to shed light on those of their properties which are related to the ability to form stable suspensions (or cloudiness). The insoluble constituents are derived from four main tissue components: (i) intracellar constituents such as protoplasmic membranes, organelles (plastids, mitochondria, etc.) and cytoplasmic

matrix; (ii) lipidic substances which include mainly carotenoids and essential oil of the flavedo and the juice sacs; (iii) insoluble pectin and dispersed micro-fibrillar elements of the wall, without whole wall fragments; and (iv) insoluble crystals of flavonoids, such as hesperidin, which appear as small needles. A significant portion of insolubles in the peel extract is stabilized due to its multiple association with oil droplets and lipidic material, which results in a decrease of its density. The needle form of the small hesperidin crystals imparts to them a high frictional coefficient, which reduces their tendency to settle. KMD

Oranges

2596 BRUSEWITZ (GH) and PAUL SINGH (R). Natural and applied wax coatings on oranges. **J. Food Process. Preserv.** 9(1); 1985; 1-9

Scanning electron microscopy was used to examine the wax coating on oranges. The natural wax platelets are irregular in shape and size, have a rough surface and increase in numbers as the orange matures. Most natural platelets can be removed by dipping the orange in a chloroform-methanol solution and rubbing the surface. Store-bought oranges have natural wax platelets 1-2 microns thick covered with a 2-5 micron layer if commercial wax. Wax applied over platelets may be ineffective if the platelets break off in handling and expose the orange's surface. Removal of natural wax platelets prior to commercial waxing allows uniform wax application and consequently between storage life. Drying with air at 2.5 m/s produced uneven wax thickness while 14 m/s air produced a complete uniform wax layer. AA

2597 CHAMARRO (J) and YAGO (M). Peroxide activity in orange flavedo tissue in relationship to ethylene induced colour changes. **Rev. Agroquim. Tecnol. Aliment.** 25(4); 1985; 545-52 (Spanish)

2598 WELTI (J) and LAFUENTE (B). Freeze-drying of comminuted orange. Influence of process parameters on the drying velocity and on the quality of the product. Rev. Agroquim. Technol. Aliment. 25(4); 1985; 532-44 (Spanish)

Sweet oranges

2599 AWASTHI (MD) and LALITHA ANAND. Dissipation pattern of monocrotophos and quinalphos residues from sweet orange fruits. **J. Food Sci. Technol. (India)** 23(2); 1986; 97-9

Sweet orange (**Citrus sinensis Osbeck**) trees were sprayed with 0.05 and 0.1% spray concentration at the rate of 2 l/tree of monocrotophos and quinalphos and the dissipation of residues were followed over 3 week period. The initial spray concentration on the fruit was 2.16 and 5.46 ppm for monocrotphos and 3.02 and 5.83 ppm for quinalphos for 0.05 and 0.1% spray respectively. Monocrotophos being highly systemic entered inside the pulp from the skin, whereas quinalphos did not enter inside the pulp. The % dissipation observed at intervals indicated that it was 81.09 and 89.10 for monocrotophos and 81.78 and 96.27 for quinalphos after 3 weeks at 0.05 and 0.10% concentration of spray. Monocrotophos dissipated at the rate of 8.98 and 6.62 days half life from the two treatment concentration to require waiting period of 32 to 34 days based on the tolerance limit of 0.2 ppm. Quinalphos dissipated at the rate of 9.23 and 7.32 days half life to require 32 days waiting period based on its tolerance limit of 0.25 ppm. KAR

Ker

2600 CHAUHAN (BM), DUHAN (A) and BHAT (CM). Nutritional value of Ker (Capparis decidua) fruit. J. Food Sci. Technol. (India) 23(2); 1980; 106-8

Unripe fruit of Ker (**Capparis decidua** Edgew) consumed by local population in many forms, was studied for its nutritional value. On DM basis, it contained 14.88% protein, 7.43% fat, 5.96% total mineral matter, 12.32% crude fibre and 59.41% digestible carbohydrates. The contents of β-carotene, ascorbic acid, Ca, P, Fe, Cu, Zn and Mn were 5.40, 120.70, 90, 179, 3.5, 1.1, 1.6 and 1.9 mg/100 g respectively. Albumin, globulin, prolamine and glutelin fractions formed 53, 16, 11 and 12% respectively of total protein in the fruit. The fruit was free from tannins, trypsin inhibitor and haemagglutinin activity and had 304 mg/100 g of phytic acid content. KAR

Mangoes

2601 SYED ISMAIL, RAMESHWAR (A) and NARAYAN RAO (M). Maturity standards for fruits of pickle mangoes. **J. Food Sci. Technol. (India).** 23(2); 1986; 105-6

In mango var. Dedseri changes in fruit volume soluble solids content and acidity were recorded at 4-day intervals from April 9 to June 12. Mangoes harvested on May 15, May 29 and June 12 were pickled. Evaluation of pickles was done 3, 6, and 12 months of after storage. The rate of acid loss of the fruits started decreasing from second fortnight of April and was followed by hardening of endocarp and cessation of increase in fruit volume and build up of soluble solids content. No differences were observed after 3rd and 6th month of preservation in pickles prepared on different dates. After 12 months storage, those prepared from less mature fruits (May 15 and May 29) were found better and the pulp texture and adherence of pulp to the skin and endocarp were better. Best stage of harvest for pickling is just after the endocarp starts hardening. KAR

2602 KHURDIYA (DS) and SUSANTA K. ROY. Studies on canning of mango slices in covering syrup containing mango pulp. **Indian Food Packer.** 40(2); 1986; 50-54

Mango pulp was added at 5, 10 and 15 and 20% level as covering syrup to improve the quality and reduce the cost of canned mango slices. Cut out analysis done after 9 months of storage at room temperature showed that addition of 15% mango pulp in the covering syrup was found to be the best. Apart from improving the quality, addition of mango pulp also increased the drained weight percentage. Further, the drained syrup could be utilised profitably as a ready-to-serve mango beverage. AA

Papayas

2603 De GOIS (VA) and CAL-VIDAL (J). Water sorption characteristics of freeze dried papaya in powdered and granular forms. **Can Inst. Food Sci. Technol. J.** 19(1); 1986; 7-11

The sorption behaviour of freeze dried papaya in granular and powdered forms was studied under different environmental conditions of temperature (13, 23, 33 and 43 C) and relative humidity (7 to 94%). The adsorption and desorption isotherms were constructed. In addition, an equation proposed previously by Iglesias and Chirife (1978) to predict the sorption behaviour of dried fruits was checked against the experimental results and a good fit was obtained. AA

Pears

2604 BEVERIDGE (T) and HARRISON (JE). Pear juice production from heated pear mashes. **Can. Inst. Food Sci. Technol. J.** 19(1); 1986; 12-6

Production of clear, virtually colourless pear juice requires inhibition of brown discolouration development due to polyphenol oxidase (PPO) activity. Thermal control of PPO results in juices which are difficult to clarify. A procedure is described for producing a clear, colourless or light golden pear juice from fresh, ripe or cull fruit, suitable for concentrate production. Whole pears are mashed in the presence of low levels of an antioxidant (SO_2 or ascorbic acid), the thermally treated (90 C, 11-20 seconds) in a tubular stainless steel heat exchanger and cooled rapidly. The thermized mash was treated with 0.01% (w/v) Irgazyme 100 at 35 C, 1 hour centrifuged at 6500 g, the supernatent treated with 0.1% (w/w) cellobiase at 50 C, 1-4 hour and again centrifuged at 6500 g. A clear, light coloured juice was obtained, its exact colour and flavour depending upon fruit condition and maturity. Fully ripened pears yield a juice with a distinct cultivar flavour. AA

Phalsa

2605 JAIN (SP), TRIPATHI (VK), RAM (HB) and SURJEET SINGH. Effect of storage conditions on storage life of some important squashes. II. Studies on the storage life of phalsa, Kaphal and litchi squashes. **Indian Food Packer.** 40(2); 1980; 36-41

Squashes were prepared from phalsa (**Grewia subinaequalis** L.) Kaphal (**Myrica nagi**) and litchi and were filled in glass bottles, kept at room temperature unwrapped for two months followed by wrapping in red, yellow, green, blue and black cellophane papers and stored at room temperature (18-26 C) (exposed to light) for 12 months. Unwrapped samples were stored in the dark at room temperature and under refrigeration (6-11 C). Squashes stored at low temperature (6-11) were superior to other storage conditions. Natural colour, taste and flavour of the squashes did not change for six months in phalsa and kaphal squash and twelve months in litchi squash. The squash bottles kept under the dark conditions were rated as next in the order of merit. The quality of squash packed in bottles covered with black cellophane papers were better in contrast to the bottle covered with red, yellow, green or blue cellophane papers. Storage of the squashes under dark conditions and covering of bottle with black papers seem to be more economical for the retention of natural colour and taste as compared to other methods. AA

Sapota

2606 VAGHANI (SN) and CHUNDAWAT (BS). Sun-drying of sapota (**Achras sapota** L.) fruits. **Indian Food Packer.** 40(2); 1986; 23-8

Kalipatti cvs. of sapota (**Achras sapota** L.) fruits subjected to pretreatments like ((i) blanching (3 minutes) + potassium metabisulphite (KMS) 1% (ii) citric acid (1%) + KMS 1%; (iii) sulphur fumigation (3 g/kg/2 hr); (iv) KMS (0.5%); (v) KMS (1%); (vi) KMS (2%); (vii) sugar syrup (40%) + KMS (1%); (viii) potassium sorbate (2%); (ix) blanching (3 minutes) + KMS (1%) + potassium sorbate (2%); (x) citric acid (1%) + KMS (1%) + potassium sorbate (2%) (xi) sulphur fumigation (3 g/kg/2 hours) + potassium sorbate (2%); (xii) KMS (1%) + potassium sorbate (2%), (xiii) sugar syrup (40%) + KMS (1%) + potassium sorbate (2%) were sun-dried (maximum temperature 50 C) for 33 hours in trays to a moisture content of 16-19% and the storage behaviour (moisture, ash, total sugar, reducing sugars) and organoleptic qualties (texture, taste, colour and appearance) of dried fruits were investigated. Weight loss during ripening of fruits and preparation of

slices was 6.88 and 28.84% respectively. The prepared slices contained 22.37% soluble solids (Brix), 10.92% reducing sugar and 14.45% total sugars. The results have shown that (vii) and (xiii) showed an yield of 34% of dry slices. Based on the data generated, (viii) was found best for texture, (vi) for colour and appearance, while for minimum browning changes (vii) and (xiii) were found to be the best. BSN

SUGAR, STARCH AND CONFECTIONERY

Sugar

2607 HALLSTROM (H). The toxicology of sugar alcohols. **Var Foda. 37**(9-10); 1985; 508-15 (Swedish)

Sugar alcohols may replace sugar in many different types of foods, e.g. confectionery, ice-cream, marmelade and bakery products. The absorption of sugar alcohols is generally slow and incomplete. The acute toxicity is very low. Most sugar alcohols have been studied in experimental animals as well as in humans. Given to test animals at high doses, the most prominent effects of sugar alcohols are: enlargement of the caceum, diarrhoea, increased intestinal absorption of calcium, renal changes (nephrocalcinosis) and neoplastic changes in urinary bladder and adrenals. With the exception of the laxative effect, none of these adverse effects have been observed in humans. AA

2608 NONUS (M) and MINIAC (Mde). Increase in ethanol production by alcoholic fermentation of sugar factory by-products (molasses and drippings). **Ind. Aliment. Agric. 102**(10); 1985; 971-85 (French)

2609 NOWAKOWSKA (K). Structure of macro-molecular dextrins. **Acta Aliment. Polonica. 11**(25)(1); 1985; 71-7

2610 SKALSKI (J). Composition of yellow dextrins. **Acta Aliment. Polonica. 11**(25)(1); 1985; 79-84

Glucose

2611 SLOMINSKA (L). Studies on the isomerization of D-glucose into D-fructose with application of immobilized glucose isomerase maxazyme G I. **Acta Aliment. Polonica. 11**(23)(1); 1985; 133-9

2612 BORUCH (M) and NEBESNY (E). Continuous isomerization of glucose in starch hydrolysates with immobilized glucose isomerase. **Acta Aliment. Polonica. 11**(25)(4); 1985; 413-25

2613 PASIN (G) and BIRCH (GG). Calcium chloride complex formation of glucose syrups and their fractions. **Food Chem. 19**(2); 1986; 149-58

Glucose syrups react with calcium salts in aqueous solution to form complexes. As a consequence, the specific rotation, viscosity, electrical conductivity and osmotic pressure of the syrups differ from those of untreated glucose syrups. Complex formation depends on calcium ion concentration,and interaction of the glucose syrup with the calcium salt affects, in turn, the activity of the calcium ions. AA

Starch

2614 NATH (BK) and CHAKRABORTY (AK). Studies on the physico-chemical properties of the starch of Eurylae ferox. Starch. 37(11); 1985; 361-3

The physico-chemical properties of starch isolated from the seeds of Eurylae ferox have been investigated mainly by methylation

studies, periodate experiments, absorption measurements, and viscosity measurements. Starch was fractionated into amylose and amylopectin by precipitation technique. The average length of unit chain in amylose and amylopectin was found to be 22 and 380 glucose units, respectively. Starch contains 25% amylose as determined by potentiometric titrations. Other properties of starch, amylose and amylopectin have been described in the present paper. AA

2615 SROCZYNSKI (A), IWANOWSKI (W) and NEBESNY (E). Obtaining of urea-modified starches and their properties. **Acta Aliment. Polonica.** 11(25)(1); 1985; 3-10

2616 SROCZYNSKI (A), IWANOWSKI (W) and NEBESNY (E). Obtaining of hydroxypropyl starch derivatives and their properties. **Acta Aliment. Polonica.** 11(25)(1); 1985; 11-20

2617 CHOCIEJ (J), KONITZ (A) and TOMASIK (P). Starch formulations containing elemental sulphur. **Acta Aliment. Polonica.** 11(25)(1); 1985; 35-42

2618 PIERZGALSKI (T). Physico-chemical properties of starch hydrolysates. **Acta Aliment. Polonica.** 11(25)(1); 1985; 63-70

2619 BABOR (K), KALAC (V) and TIHLARIK (K). Characteristics of enzymatically degraded starch. **Acta Aliment. Polonica.** 11(25)(1); 1985; 85-7

2620 KOSICKI (Z), JAROSLAWSKI (L) and ZIELONKA (R). Effect of technological parameters on the course of acidic hydrolysis of starch. **Acta Aliment. Polonica.** 11(25)(1); 1985; 89-95

2621 BOLACH (E), LESNIAK (W) and ZIOBROWSKI (J). Starch hydrolysis in citric acid fermentation. **Acta Aliment. Polonica.** 11(25)(1); 1985; 97-104

2622 BORUCH (M), BRZEZINSKI (S) and PALKA (A). Utilization of the reflection of infrared radiation in measurements of concentration of water suspensions of starch. **Acta Aliment. Polonica.** 11(25)(1); 1985; 105-14

2623 BORUCH (M), BREZEZINSKI (S) and PALKA (A). The use of dielectric properties of starch in measurements of its humidity. **Acta Aliament. Polonica.** 11(25)(1); 1985; 115-24

2624 SLOMINSKA (L) and MACZYNSKI (M). Studies on the application of pullulanase in starch saccharification process. **Starch.** 37(11); 1985; 386-90

Pullulanase belongs to direct debranching enzymes which separate α-1,6-links directly by splitting side chains of various length. In connection with the enzyme research a specific trade product of thermostable, acidophilic pullulanase of **Bacillus** species was investigated. Investigations have been carried out with the aim of improving saccharification of liquified potato starch by simultaneous application of glucoamylase and pullulanase. The results of the investigations carried out until now can be summarized by increasing the effectiveness of saccharification process, reduction of reaction time and increasing of substrate concentration. AA

BAKERY PRODUCTS

Bread

2625 BARBER (S), BENEDITO DE BARBER (C) and LLACER (MD). Chemical changes during bread dough fermentation. III. Dietary fibre fractions. **Rev. Agroquim. Tecnol. Aliment.** 25(4); 1985; 572-8 (Spanish)

2626 BENEDITO DE BARBER (C), COLLAR (C) and BARBER (S). Chemical changes during bread-dough fermentation. IV. Extraction and electrophoretic characterization of wheat gluten gliadins solubilized by different solvents. **Rev. Agroquim. Tecnol. Aliment.** 25(4); 1985; 579-90 (Spanish)

2627 MOORE (WR) and HOSENEY (RC). Influence of shortening and surfactants on retention of carbon dioxide in bread dough. **Cereal Chem.** 63(2); 1986; 67-70

During heating of bread dough containing shortening or surfactants in a resistance oven, carbon dioxide was lost at a slow rate for the first 9 minute. During the same period the dough increased in height in a linear fashion. After 9 minutes of heating, carbon dioxide was lost at a greater rate, and the rate of dough expansion slowed. With no shortening or surfactant in the formula, the rate of carbon dioxide loss increased after only 2 minutes of heating. This also corresponded with a lower rate of dough expansion. Artificially restricting dough expansion increased the rate of carbon dioxide loss. Measurement of dough rheology showed that dough without shortening undergoes a change at about 55 C, but dough with shortening does not. Thus, the increased loss of carbon dioxide at higher temperatures was found to be the result of a rheological change in the dough that restricted expansion rather than increased permeability of the dough to carbon dioxide. AA

2628 GAYLE (PE), KNIGHT (EM), ADKINS (JS) and HARLAND (BF). Nutritional and organoleptic evaluation of wheat breads supplemented with pigeon pea (**Cajanus cajan**) flour. **Cereal Chem.** 63(2); 1986; 136-8

In an attempt to introduce nutritious products through the creative use of indigenous foods, a study was conducted to determine the physical, sensory, and nutritional characteristics of all-purpose wheat flour breads supplemented with pigeon pea (**Cajanus cajan**) flour at the 0, 5, 10, 15, and 25% levels. Proximate composition (protein, fat, moisture, ash, carbohydrate, and fiber) was determined for all breads. Available lysine, phytate, zinc, and the phytate/zinc molar ratios were also determined. As an increased quantity of pigeon pea flour was substituted for the all-purpose wheat flour in these experimental breads, acceptance by a taste panel remained favourable with no significant differences among the means of the characteristics measured in all breads ($P < 0.05$). An increase in pigeon pea flour from 0 to 25% increased protein content (from 9.19 to 13.0%), lysine (from 0.3 to 171.0 mg lysine/16 g N), and zinc (from 5.26 to 5.80 ug/g). However, there were increases in phytate (1.6-2.5 mg/g) and the phytate/zinc molar ratios (30-43) as well. These molar ratios may provide an estimate of the bioavailability of zinc from the breads. AA

2629 MOORE (WR) and HOSENEY (RC). The effects of flour lipids on the expansion rate and volume of bread baked in a resistance oven. **Cereal Chem.** 63(2); 1986; 172-4

When baked in an electrical resistance oven, doughs made with

shortening attained a greater height than doughs made without shortening. The expansion rate of doughs made without shortening decreased at temperatures above 55 C. Fractionation and reconstitution experiments showed that the rheological changes observed in nonshortening doughs were caused by the free polar lipids and gluten proteins of flour. AA

2630 WAHREN (M). Stages of development from the grain kernel to bread during the fifth and fourth millenium (Newest results from excavation). **Getreide Mehl Brot. 39**(12); 1985; 373-9 (German)

2631 KUHN (MC) and GROSCH (W). Fractionation and reconstitution of rye flour - A special technique for investigating NSP-hydrolases in the production of rye bread. **Getreide Mehl Brot. 39**(11); 1985; 340-44 (German)

By using a method that had been developed earlier for wheat flour, the authors have fractionated rye flour into separate fractions containing a high proportion of soluble NSP (non-starch polysaccharides), insoluble NSP, sekunda starch, and prima starch, respectively. On recombining the fractions one can obtain flours which are poor in α-amylase, but behave just like the original flour in baking tests and baking properties. This method is suitable only for the examination of NSP-hydrolases. The composition of the flour fraction which is incubated with the crude enzyme preparate also determines which of the enzymes contained in the preparate can exert their action. KMD

2632 KAWKA (A) and GASIOROWSKI (H). Effect of sodium stearoyl-2-lactylate on the quality of enriched skim-milk powder with a wheat rye (1:1) bread. **Getreide Mehl Brot. 39**(12); 1985; 369-73

Addition of skim-milk powder to a wheat-rye dough increases the water-binding capacity of the dough and improves its rheological properties - viz. dough development time and stability; but the quality of wheat-rye bread deteriorates. Addition of 0.5% sodium stearyl-2-lactylate (NSL) to such a dough produces the optimum effects. The rheological properties of the dough and the quality of the bread are both improved. The best quality is attained by addition of 2% and 4% skim milk powder, along with 0.5% NSL. These additives also prolong the freshness of the bread. KMD

Cakes

2633 DONELSON (JR) and CLEMENTS (RL). Components of cake batter expansion in white layer cakes. **Cereal Chem. 63**(2); 1986; 109-10

Free flour lipids are necessary for expansion of batter in white layer cakes. Hexane extracted flour residue controls the degree of batter expansion in chlorinated patent flours. Shortening emulsifiers, probably influence baking performance by contributing to batter aeration, whereas free flour lipids probably contribute to foam stability. BSN

Chapaties

2634 VENKATESWARA RAO (G), LEELAVATHI (K), HARIDAS RAO (P) and SHURPALEKAR (SR). Changes in the quality characteristics of chapati during storage. **Cereal Chem. 63**(2); 1986; 131-5

The tearing resistance tester and Warner Bratzler shear press have been adapted successfully to evaluate, objectively, the quality changes in chapati during storage. Tearing strength, indicative of development of brittleness, decreased markedly from 72.5 to 31.0 g and only slightly during three days storage when chapati was packed in polyethylene pouches and in waxed paper, respectively. Warner Bratzler shear value served as an index of texture and decreased by 21 and 46% for chapaties packed in waxed paper and polyethylene pouches, respec-

tively. A simple pliability tester was devised to measure chapati pliabilty. When chapaties were packed in waxed paper, pliability decreased from 2.3 to 1.2 cm, but increased from 2.1 to 4.4 cm when packed in polyethylene pouches. Although no significant difference was observed in salt-soluble proteins and ether extractives during storage, starch was found to be affected significantly. this was indicated by decreases in water retention capacity, falling number, enzyme-susceptible starch, and soluble starch. Furthermore, both amylose and amylopectin were found to decrease, possibly contributing thereby to staling of chapati. Although heat treatment of chapati packed in a polyethylene pouch delayed mold attack from three to 90 days, the chapati had a somewhat cooked flavour and was brittle, as indicated by the marked decrease in shear value. Addition of salt (1.25%), glycerol monostearate (0.5%), sorbic acid (0.2%), and fat (4%) minimized the development of brittleness to some extent. AA

2635 RAJA (KCM). Texture characteristics of cassava wheat dough and sensory properties of chapathi. **J. Food Sci. Technol. (India). 23**(2); 1986; 7-9

Cassava chips, plain and parboiled (prepared by soaking in boiling water for 5 minutes) were dried, ground to pass through 60 mesh sieve and mixed separately with whole wheat flour at 70, 50 and 30% levels and chapathis were prepared. Parboiling of cassava slices increased firmness and cohesiveness of the dough. Incorporation of plain cassava flour at > 30% to wheat flour improved the colour and appearance of chapathi but scored less in handfeel, mouthfeel, and taste than chapathi prepared from whole wheat flour alone. Blending of parboiled cassava flour with wheat flour improved the organoleptic qualities of chapathi compared to those prepared by blending plain cassava flour with wheat flour. KAR

Noodles

2636 OH (NH), SEIB (PA), FINNEY (KF) and POMERANZ (Y). Noodles. V. Determination of optimum water absorption of flour to prepare oriental noodles. **Cereal Chem. 63**(2); 1986; 93-6

MILK AND DAIRY PRODUCTS

2637 SINHA (RN) and SINHA (PR). Incidence of clostridia with reference to dairy processing. **J. Food Sci. Technol. (India). 23**(2); 1986; 103-5

A total of 98 samples of cow milk (38), buffaloe milk (20), pasteurized cow milk (20) and processed cheese (20) were analysed for total clostridial and spore counts using most probable number. The range of values (per 100 ml) for clostridial and spore counts was 0-160 and 0-91 for raw cow milk, 0-430 and 0-150 for raw buffaloe milk, 0-360 and 0-150 for pasteurized cow milk and 0-460 and 0-460/g for processed cheese, respectively. KAR

Milk

2638 BLACK (RG), CUNNINGTON (BR) and REZK (G). A study of three instruments for milk composition payment testing. **Aust. J. Dairy Technol. 40**(2); 1985; 152-6

The study has shown that Milkoscan 104, Multispec M and Infra Alyzer 400 D are capable of testing for fat and solids - not-fat analysis for payment purposes. Results from the IR transmission instruments were similar to published results even though a different reference fat method was used. The NIR instrument was shown to be capable of similar accuracy and repeatability to the IR transmission

instruments. KAR

2639 SAI PRAKASH (B) and SHARMA (RS). Orotic acid in milk and milk products. J. Food Sci. Technol. (India) 23(2); 1986; 85-7

The orotic acid content in the milk of various breeds of cow and other species was in the order: Jersey (52.60 + 22.0 µg/ml) > Kankrej > Kankrej x Holstein > Kankrej > buffalo (19.55 ± 8.05 ug/ml) x Jersey > Kankrej x Holstein > Kankrej > buffalo (19.55 ± 8.05 µg/ml) > goat > human milk (1.49 µg/ml). First locatation milk of Jersey cows contained significantly higher ($P < 0.05$) orotic acid than the animals in second and third lacatation, but such relationship was not found in case of other breeds of cows and buffaloes. Orotic acid was also significantly higher in the milk of Jersey cows in late lactation stage but not in case of Kankrej cows and buffaloes. The order of orotic acid content in commercial dairy products was skim milk powder (489.43 ± 4.73 µg/g solids) > sweetened condensed milk > ice-cream > baby fonds > processed cheese > dahi (55.53 ± 33.64 µg/g solids). AA

2640 RAVI KIRAN, ISHIT PREET KAUR and VANEJA (K). Studies on acceptability and availability of fortificants present in milk and whey. J. Food Sci. Technol. (India) 23(2); 1986; 110-11

Milk and whey were fortified with ferric lactose by adding 25 mg of ferric lactose (6.25 mg of Fe), and 25 mg of ascorbic acid dissolved in 5 ml of water to 95 ml milk or whey. Fortification did not show any marked effect on appearance, colour constistency, taste and flavour of milk and whey and the product was rated as very good by the panel of judges. Fortification did not affect the keeping quality when kept at 4 C for 3 days. Thiobarbituric acid value of milk decreased after fortification. In fortified milk and whey 93.6 and 94.2% of the added Fe was present in ferrous form respectively. KAR

2641 THERON (DP), PRIOR (BA) and LATEGAN (PM). Sensitivity and precision of bioluminescent techniques for enumeration of bacteria in skim milk. J. Food Prot. 49(1); 1986; 8-11

Sensitivity and precision of the ATP assay were improved when a chilled **Enterobacter cloacae** skim milk culture was activated at 30 C for 30 minutes and the ATP was extracted with boiling Tris/EDTA buffer (1:10 culture/buffer ratio). Of three luciferase-luciferin preparations evaluated. Monitoring reagent (a purified preparation) yielded the highest light output that reached a peak 60 seconds after injection of the sample and remained stable thereafter. Skim milk quenches the light output and necessitates the use of an internal ATP standard for the ATP assay. Skim milk samples containing between 12.5 and 200 pg of ATP were assayed with a mean precision of 3.1% (coefficient of variation; CV). Lower ATP concentrations could be determined with poorer precision. The lower limit of precise (7% CV) E. cloacae enumeration in skim milk was 1.6×10^5/ml. AA

2642 THERON (DP), PRIOR (BA) and LATEGAN (PM). Determination of bacterial ATP levels in raw milk: Selectivity of non-bacterial ATP hydrolysis. J. Food Prot. 49(1); 1986; 4-7

The selective destruction of non-bacterial ATP and subsequent determination of bacterial ATP using the ATP bioluminescent technique was investigated. Treatments to release ATP from somatic cells and hydrolyze free ATP also significantly reduced the ATP content of Enterobacter cloacae in skim and raw milk. The reduction can mainly be ascribed to apyrase (an ATPase) affecting the ATP content of intact bacteria. Somatic cell treatments failed to completely eliminate non-bacterial ATP. Although treatment with a somatic release agent, EDTA and apyrase, resulted in a 96% reduction in the ATP content of raw milk, the remaining non-bacterial ATP was still considerably more than found in the bacterial component of raw milk studied here. Until reagents are available to selectively destroy all non-bacterial ATP

without affecting the bacterial ATP content, the bioluminescent technique will have limited application in determination of the bacterial quality of raw milk. AA

2643 BISHOP (JR) and WHITE (CH). Estimation of potential shelf-life of pasteurized fluid milk utilizing bacterial numbers and metabolites. **J. Food Prot. 48**(8); 1985; 663-7

A study was conducted on use of bacterial numbers and their metabolites, and any possible interaction thereof, as estimators of the potential shelf-life of pasteurized fluid milk. Whole and skim milk samples were obtained on the day of processing. Samples of each milk were inoculated in duplicate with 0, 1,000 or 100,000 bacteria/ml with a pure strain of **Pseudomonas fluorescens** P27. Samples, stored at 7 C, were analyzed for microbiological and biochemical parameters every 5 days for up to 20 days with organoleptic evaluations conducted on a daily basis. On days of analysis, each sample was subjected to various preliminary incubations. Bacterial enumerations conducted were psychrotrophic bacteria count, standard plate count, gram-negative bacteria count, and modified psychrotrophic bacteria count. Lipopolysaccharide (endotoxin) concentrations, degree of proteolysis and impedance detection were also determined. All bacterial enumerations and proteolysis were significantly related to potential shelf-life of pasteurized fluid milk (whole, skim, and combined) but were of little predictive value. Endotoxin concentration and impedance detection were highly significantly related to shelf-life, and provided predictive regression equations. Using combined data from whole and skim milk, impedance detection resulted in the preferred prediction equation suitable for pasteurized fluid milks. AA

2644 BOUZAS (J), KAMAREI (AR) and KAREL (M). Storage stability of milk fat globule membrane. **J. Food Process. Preserv. 9**(1); 1985; 11-24

2645 YOUSEF (AE) and MARTH (EH). Degradation of aflatoxin M1 in milk by ultraviolet energy. **J. Food Prot. 48**(8); 1985; 697-8

Raw whole milk was artificially contaminated with 0.5 or 1 ppb aflatoxin M1. Contaminated milk was exposed to UV-irradiation from different sources and under different experimental conditions. In all instances, exposure to UV-irradiation caused aflatoxin M1 in milk to degrade. The magnitude of degradation (3.6 to 100%) depended on time of exposure (2 to 60 minutes) of milk to UV-energy, volume of treated milk and design of the experiment. Presence of hydrogen peroxide (1%) in milk greatly enhanced degradation (100% in 10 minutes) of aflatoxin M1 by UV-irradiation. AA

2646 MISTRY (VV) and KOSIKOWSKI (FV). Fermentation of ultrafiltered skim milk retentates with mesophilic lactic cheese starters. **J. Dairy Sci. 68**(7); 1985; 1613-7

2647 FRANKHUIZEN (R) and VEEN (NG). Determination of major and minor constituents in milk powders and cheese by near infra-red reflectance spectroscopy. **Neth. Milk Dairy J. 39**(4); 1985; 191-207

This study reports on the suitability of NIR for the determination of major and minor constituents in milk powder and cheese. In order to evaluate the suitability, these products were analysed for moisture, fat, protein, lactose, lactate, ash, salt (in dry matter) processing salts, pH, phospholipids and glycomacropeptide by reference methods. On the basis of these results the NIR apparatus was calibrated after which by use of the calculated regression equations the composition of the molecular sample could be determined. KAR

2648 CZARNOCKA-ROCZNIAKOWA (B) and MACIEJSKA (A). Utilization of penicillianase-producing **Micrococcus** strains in the technology of fermented

milk products. I. Decomposition of penicillin in milk by selected Micrococcus strains. Acta Aliment. Polonica. 11(25)(4); 1985; 461-7

2649 MACIEJSKA (A) and CZARNOCKA-ROCZNIAKOWA (B). Utilization of penicillinase-producing **Micrococcus** strains in the technology of fermented milk products. II. Effect of penicillinase-producing Micrococcus strains on the fermentative activity of lactic starter bacteria. Acta Aliment. Polonica. 11(25)(4); 1985; 469-75

2650 PACKARD (VS). Contaminants in human milk - An update. J. Food Prot. 48(8); 1985; 724-9

Breastfeeding is a natural and worthy practice, encouraged and promoted by many health professionals. Under most conditions, breast-milk serves infant nutritional and immunological needs well. Nevertheless, there are risks engendered in the practice, one of the more serious of which centers on contamination of human milk with drugs, pesticides, and environmental contaminants. As a reminder of the fact and to highlight some recent research findings, this review is offered. AA

Butter

2651 ROGERS (WP) and KIESEKER (FG). Observations on the manufacture of recombined butter. **Aust. J. Dairy Technol. 40**(4); 1985; 157-63

Recombined butter was manufactured from anhydrous milk fat and non-fat-milk-solids using a swept surface heat exchanger and worker unit. The initial flavour and keeping quality of the butter were dependent on the quality and storage stability of the basic materials. Changes in processing variables and the use of additives influenced the hardness, stand-up and oiling-off properties of the product. AA

Cheese

2652 HICKS (CL), O'LEARY (J) and HOLBROOK (J). Effect of lecithin on cheese yield. **J. Dairy Sci. 68**(7); 1985; 1603-7

2653 BARBOSA (MDFS), SILVA (DO), PINHEIRO (AJR), GUIMARAES (WU) and BORGES (AC). Production of beta-D-galactosidase from **Kluyveromyces fragilis** grown in cheese whey. **J. Dairy Sci. 68**(7); 1985; 1618-23

Curd

2654 WALSTRA (P), DIJK (HJM) and GEURTS (TJ). The syneresis of curd. 1. General considerations and literature review. Neth. Milk Dairy J. 39(4); 1985; 209-46

The structure of rennet and acid milk gels is briefly discussed, in relation to the properties of the caseinate particles and the manner of gelation. Methods of estimating syneresis under various conditions are reviewed. Literature results of factors affecting syneresis rate and end-point are extensively reviewed. KAR

MEAT AND POULTRY

Meat

2655 HONIKEL (KO), KIM (CJ), HAMM (R) and RONCALES (P). Sarcomere shortening of prerigor muscles and its influence on drip loss. Meat Sci. 16(4); 1986; 267-82

2656 HIGLEY (NA), TAYLOR (SL), HERIAN (AM) and LEE (K). Cholesterol oxides in processed meats. **Meat Sci. 16**(3); 1986; 175-88

Methods for the extraction of cholesterol oxides from meats were studied. A dry column technique for the extraction of sterols was found to be more rapid and convenient than conventional chloroform-methanol extraction. An overall yield of 32.0% and 23.6% for radiolabelled cholesterol and cholesterol oxides, respectively, was obtained after dry column extraction, saponification and chromatography on a silica arrestant column, Florisil-$AgNO_3$ column and silica Sep-Pak column. The overall extraction efficiency of ten meat samples was 22.3±1.7%. Cholesterol oxides present in measurable amounts included 5-cholesten-3β, 19-diol, 5-cholesten-3β-ol, 22 one, the α and β epimers of 5-cholesten-3β, 7-diol and cholestan-3β, 5α, 6β-triol in some of themeat samples analyzed, but, for the majority of samples, no detectable amounts of known cholesterol oxides were found. Most of the meats, however, contained unidentified components that are non-polar with respect to cholesterol. AA

2657 LITTEL (KJ), PIKELIS (S) and SPURGASH (A). Bioluminescent ATP assay for rapid estimation of microbial numbers in fresh meat. J. Food Prot. 49(1); 1986; 18-22

The utility of a bioluminescence adenosine triphosphate (ATP) procedure to estimate bacterial levels in fresh meat products was investigated. A double filtration (DF) sampling procedure was used. In this system two filters were fitted in tandem. A prefilter was used to trap food particles which contained contaminating ATP while the second filter retained the microbial population. The second filter was treated with an enzyme reagent to hydrolyze nonmicrobial ATP that was present on the bacterial filter. Using standard curves,the related bacterial ATP (B-ATP) and plate counts, the bacterial ATP levels in fresh beef and chicken samples were transformed into estimated bacterial levels in the products. The ATP procedure was able to predict bacterial levels within +/- 0.5 $\log_{10}$ of the actual plate count for greater than 90% of the fresh beef and chicken samples tested. Mean femtogram (fg) ATP/CFU levels in fresh beef and chicken mixed bacterial flora were 0.88 and 0.94, respectively. Minimal sensitivity of the double filtration/enzyme method was approximately 5×10^4 CFU/g of meat sample. AA

2658 LEPETIT (J), SALE (P) and OUALI (A). Post-mortem evolution of rheological properties of the myofibrillar structure. Meat Sci. 16(3); 1986; 161-74

2659 MITTAL (P) and LAWRIE (RA). Extrusion studies of mixtures containing certain meat offals: Part 2. Textural properties. Meat Sci. 16(2); 1986; 143-60

2660 MATTIOLI (M), GALEATI (G), GAIANI (R) and CHIESA (F). Detection of oestrogen residues in meat by radioreceptor assay. Meat Sci. 16(2); 1986; 79-89

Beef

2661 SOLOMON (MB). Effect of different types and locations of the electrode source of an extra low voltage electrical stimulation system on beef quality. **Meat Sci. 16**(3); 1986; 217-24

2662 DRANSFIELD (E), LOCKYER (DK) and PRABHAKARAN (P). Changes in extensibility of raw beef muscle during storage. Meat Sci. 16(2); 1986; 127-42

2663 ORESHKIN (EF), BORISOVA (MA), TCHUBAROVA (GS), GORBATOV (VM), PERMYAKOV (EA), SHNYROV (VL) and BURSTEIN (EA). Conformational changes in the muscle proteins of cured beef during heating. **Meat Sci. 16**(4); 1986; 297-305

Denaturation in structural proteins of cured beef **longissimus dorsi** muscle occurred on heating at 40-55 C, 55-61 C, 62-70 C and above 70 C, in contrast to the three endothermic transitions reported for non-cured meats when examined by fluorescence and differential scanning calorimetry. BSN

2664 LEDWARD (DA), DICKINSON (RF), POWELL (VH) and SHORTHOSE (WR). The colour and colour stability of beef **Longissimus dorsi** and **Semimembranosus** muscles after effective electrical stimulation. Meat Sci. 16(4); 1986; 245-65

2665 HAUSCHILD (AHW), POSTE (LM) and HILSHEIMER (R). Toxin production by Clostridium botulinum and organoleptic changes in vacuum-packaged raw beef. **J. Food Prot. 48**(8); 1985; 712-6

Vacuum-packed beef, inoculated with **Clostridium botulinum** spores of types A and B and incubated at 25 C, was monitored for the production of toxin and for changes in appearance and odour. Toxin was detected first after 6 days of incubation and was always accompanied by significant organoleptic changes when compared to meat stored at 4 C. Uninoculated meat samples stored at 25 C remained non-toxic, whereas their sensory scores, in particular with respect to appearance, were similar to those of the inoculated samples. AA

2666 CAMPANO (SG), KOTULA (AW) and KINSMAN (DM). Antibacterial nature of molds isolated from aged beef. **J. Food Prot. 48**(8); 1985; 699-701

The antibacterial and competitive nature of the molds **Thamnidium elegans**, **Mucor mucedo** and **Chaetostylum fresenii**, commonly isolated from beef aging at refrigeration temperature for extended periods, were examined to determine if their presence on meat would inhibit bacterial growth. An agar plate method revealed no growth inhibition of six strains of meat spoilage bacteria by the molds examined. Eye round (semitendinosus) roasts were inoculated with spore suspensions containing nine strains of the three fungal species and incubated for 48 hours at 4 or 18 C. Initial aerobic bacterial counts (35 C) on the meat samples were 2.4×10^4 CFU/cm^2. Mold treatment had no significant effect ($P > 0.05$) on reduction of aerobic bacterial counts (35 and 7 C), coliforms or fecal streptococci when compared with uninoculated controls. No surface fungal growth was evident after 48 hours at 4 C, the normal storage temperature for meat, whereas appreciable mycelial development was apparent after 48 hours at 18 C. **T. elegans**, **M. mucedo** and **C. fresenii** were not capable of reducing or controlling bacterial growth on meat surfaces at refrigeration or elevated temperatures. AA

Buffaloes

2667 KONDAIAH (N), KESAVA RAO (V), ANJANEYULU (ASR), SHARMA (N) and LAKSHMANAN (V). Evaluation of variety meats from buffaloes for some quality parameters. **J. Food Sci. Technol. (India) 23**(2); 1986; 113-5

Low cost variety of meats comprising head, tripe and heart from buffaloes were evaluated for compositional and functional properties and were compared with thigh (carcass) meat. Protein content was higher in thigh (20.76%) and head (21.80%) meats, while fat was higher in the heart (5.02%). Non protein N was higher in the thigh meat (0.28%) and hydroxyproline was higher in the head meat (0.54%) indicating high collagen content. pH was significantly different in all the four meats; head and tripe meat had higher pH (6.43 and 6.90) resulting in higher water hoplding capacity (WHC). Heart meat showed the lowest WHC with negative value. Cooking release volume did not

differ significantly in different meats while emulsifying capacity was significantly higher in head and thigh meats. Head meat ranked better in quality than tripe and heart meat and is comparable to thigh meat. KAR

2668 SHARMA (N), GANDEMER (G), GOUTEFONGEA (R) and KOWALE (BN). Fatty acid composition of water buffalo meat. **Meat Sci. 16**(3); 1986; 237-43

2669 PRABHAKAR (K) and NARAYANA RAO (PL). Comparison of organoleptic and related characters of buffaloe meat with beef. **J. Food Sci. Technol. (India) 23**(2); 1986; 90-93

Buffaloes (**Bos bubalis**) and Zebu cattle (**Bos indicus**) in five live weight groups ranging from 51 to 175 kg were slaughtered and **Longissimus dorsi** muscle between 7th thoracic and 2nd lumbar vertibrae and Semimembranosus muscle from the right side of the carcasses were separated and analysed for total myoglobin content, expressible juice, shear value and muscle fibre diameter beside organoleptic evaluation for colour, tenderness, texture, juiciness and flavour. Significant differences were not observed in colour of lean, total myoglobin content, shear value, muscle fibre diameter, texture, juiciness and flavour between buffaloe meat and beef of different age groups. Buffaloe muscle recorded lower ultimate pH, and lower water holding capacity; the differences were significant in 101 to 125 kg and 126 to 150 kg wt. groups only. KAR

Bulls

2670 YOUNG (OA), FOOTE (DM) and BASS (JJ). Effect of zeranol on bull muscle fibre composition. **Meat Sci. 16**(3); 1986; 189-97

Veal

2671 EIKELENBOOM (G) and SMULDERS (FJM). Effect of electrical stimulation on veal quality. **Meat Sci. 16**(2); 1986; 103-12

Cattle

2672 WAGNER (JR) and ANON (MC). Effect of frozen storage on protein denaturation in bovine muscle. 1. Myofibrillar ATPase activity and differential scanning calorimetric studies. **J. Food Technol. 21**(1); 1986; 9-18

2673 SMULDERS (FJM), EIKELENBOOM (G) and LOGTESTIJN (JGVan). The effect of electrical stimulation on the quality of three bovine muscles. **Meat Sci. 16**(2); 1986; 91-101

Pork

2674 ANJANEYULU (ASR) and SMIDT (HD). Effect of modified atmospheres on the shelf-life of pork chops. **J. Food Sci. Technol. (India) 23**(2); 1986; 88-90

Fresh pork chops were stored for 16 days under (i) air (control), (ii) vacuum (95%), (iii) high vacuum (99.9%), (iv) CO_2 (99.9%), (v) N (99.9%) and (vi) N_2O (99.9%) at 2 C and the effect on pH, colour (Hunter's L,a,b values), smell and total bacterial counts was studied. The redness of chops decreased in all treatments except in (iii). Chops had acceptable smell upto 9th day storage in (i), (v) and (vi) upto 13th day in (ii) and (iii) and upto 16th day in (iv). Chops stored in (iv) showed low bacterial count throughout the storage period. (v) and (vi) did not inhibit microbial growth. It is concluded that CO_2 enriched atmosphere was suitable for packaging fresh pork, while vacuum packaging maintained the red colour. KAR

Hogs

2675 HUFFMAN (DL), ANDE (CF), STANLEY (MH) and OVERBAUGH (CN). Relationship of hot-processing and method of forming with quality of whole hog sausage patties. J. Food Prot. 48(8); 1985; 702-4

Two crossbred sows (ca. 160 kg) were slaughtered for each of two replications of an experiment designed to determine the effect of hot-processing and method of patty-forming on the quality of whole hog sausage. One side from each carcass was randomly selected for either hot-processing or cold-processing (control). For each replication, two sides per processing treatment were hand-deboned and the meat ground through a 9.5 mm plate, seasoned, then reground through a 3.2-mm plate and subdivided into two batches. One batch was stuffed into 7.6 cm diameter caseings, frozen, tempered and sliced into patties (Stufffed/Sliced), whereas the remaining batch was formed into the same size patties using a Versaform forming machine (model VF 20). Patties were placed in styrofoam trays, overwrapped with PVC film, sealed in wax-lined boxes, and stored at -10 C until analyzed. Hot-processed patties had greater bind, lower shear values and less expressible free water (higher water-holding capacity) than cold-processed patties. Formed patties had less free water than Stuffed/Sliced patties. Micro-textural properties were evaluated by scanning electron microscopy (SEM). The micro-texture was slightly different from patties from the various treatments. AA

Pigs

2676 MOLANDER (E). Effect of singeing on the texture and histological appearance of pig skin. Meat Sci. 16(3); 1986; 225-35

2677 MONIN (G), TALMANT (A), LABORDE (D), ZABARI (M) and SELLIER (P). Compositional and enzymatic characteristics of the Longissimus dorsi muscle from large white, halothane-positive and halothane-negative pietrain, and hampshire pigs. Meat Sci. 16(4); 1986; 307-16

Sheep

2678 KEMPSTER (AJ), CHADWICK (JP), CUE (RI) and GRANTLEY-SMITH (M). The estimation of sheep carcass composition from fat and muscle thickness measurements taken by probes. Meat Sci. 16(2); 1986; 113-26

Meat products

2679 OCKERMAN (HW) and BOESEL (B). Evaluation of a comminuted meat product containing a solid metal contaminant. J. Food Prot. 49(1); 1986; 14-7

Frankfurters containing a solid metal object (nail) were subjectively evaluated on the basis of emulsion colour change adjacent to the metal, insertion channel development, and moldilng of the meat around the object. Frankfurters contaminated during the processing phase of production, whether boiled or not boiled, showed significantly greater colour change than did frankfurters contaminated during the distribution or consumer phase. However, these same frankfurters had significantly less distinct insertion channels. No ch nnel could be observed in frankfurters which were contaminated before processing and before cooking/smoking. Molding of the meat around the object did not provide distinguishable evidence for time of insertion. AA

2680 RAVESTEIN (P) and DRIEDONKS (RA). Quantitiative immunoassay for soya protein in raw and sterilized meat products. J. Food Technol. 21(1); 1986; 19-32

The enzyme-linked immunoabsorbent assay (ELISA) for quantitative estimation of soya protein in raw and sterilized meat products has a

detection limit of 0.5% soya protein. At much lower concentration, estimation becomes feasible by immunoblotting. The antibodies used are specific for sodium dodecyl sulphate (SDS) denatured soya protein subunits. Optimum recovery of protein components is assured by extraction with SDS and 2-mercaptoethanol with removal of SDS, product extracts may be directly by ELISA using nitrocellulose as a solid phase. BSN

2681 COLLINS-THOMPSON (DL), CALDERON (C) and USBORNE (WR). Nisin sensitivity of lactic acid bacteria isolated from cured and fermented meat products. **J. Food Prot. 48**(8); 1985; 668-70

Thirty strains of lactic acid bacteria from different meat sources (bologna, summer sausage, thurlinger sausage, chicken loaf and bacon) were tested for nisin sensitivity. The maximum concentration of nisin permitting growth for 20 strains was 50 IU/ml. Lactobacilli classified as a typical were sensitive to <5 IU nisin/ml. These strains could not be induced to increase resistance by five transfers to media with increased nisin concentrations. The ten strains with the higher resistance to nisin were checked for nisinase activity. One strain **Lactobacillus brevis**, showed weak nisinase activity and the rest were negative. AA

2682 BELL (RG) and LACY (KMDe). Factors influencing the determination of nisin in meat products. **J. Food Technol. 21**(1); 1986; 1-7

Recovery of nisin from minced meat and meat emulsions was poor and variable. The rate of recovery was little affected by the presence of NaCl and/or $NaNO_2$, particle size, or the meat to extractant (0.2N HCl) ratio, but was significantly affected by the fat content of the meat. For nisin added at 100 iu/g, recoveries at the optimal meat to extractant ratio, 10% w/w suspension, ranged from 26% at 3% fat to 76% at 83% fat. At addition levels of 200 iu/g and greater, nisin recovery efficiency was reduced. AA

Bacon

2683 TANAKA (N), MESKE (L), DOYLE (MP), TRAISMAN (E), THAYER (DW) and JOHNSTON (RW). Plant trials of bacon made with lactic acid bacteria, sucrose and lowered sodium nitrite. **J. Food Prot. 48**(8); 1985; 679-86

Bacon prepared with 40 and 80 mg/kg (ppm) sodium nitrite, 0.7% sucrose and a culture of **Pediococcus acidilactici** (Wisconsin Process), and control bacon prepared with 120 ppm sodium nitrite and no added sucrose or bacterial culture were produced at three commercial bacon production plants. Sodium chloride, phosphate and sodium ascorbate (or sodium erythorbate) levels, as well as other processing conditions such as pumping rate, smokehouse temperature and time, forming and slicing conditions, were those normally used by each plant. Randomly selected samples of each lot were used for a challenge experiment with **Clostridium botulinum** (types A and B), with ca. 1,000 heat-shocked spores/g of bacon inoculated on each slice, vacuum packaged and incubated at 27 C. Samples were taken periodically upto 56 days of incubation and examined for the presence of botulinal toxin. The challenge experiment revealed that test bacon was substantially greater in antibotulinal properties than the contrtol bacon. Residual nitrite levels of test bacon were lower than those of the control bacon, as were nitrosamines formed upon frying. Average N-nitrospyrrolidine level was 8.6 ug/kg (ppb) in the control, <2.7 ppb in the 80-ppm nitrite product, and <1.6 ppb in the 40 ppm nitrite product. This study indicates that bacon commercially prepared by the Wisconsin Process with 40 or 80 ppm sodium nitrite has a lesser risk of nitrosamine and botulinal toxin formation than bacon prepared with 120 ppm sodium nitrite and no added sucrose and lactic acid bacteria. AA

2684 JEREMIAH (LE). Effects of antioxidants on rancidity development and palatability of frozen bacon. J. Food Prot. 48(8); 1985; 653-8

The efficacy of four antioxidants for retarding rancidity development and maintaining the palatability of frozen bacon slices were examined. The antioxidants (ascorbic acid, butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT) and propyl gallate) were incorporated into a dry sugar bacon cure alone or in combination. Results indicated that the incorporation of these antioxidants alone or in combination generally reduced rancidity development in bacon slices during prolonged frozen storage. However, the combination of BHA, BHT and propyl gallate was the only antioxidant treatment which was effective for extending the frozen storability of bacon slices from the standpoint of flavour desirability and overall palatability. Bacon slices cured in the presence of this antioxidant combination remained acceptable for ca. 84 days longer during frozen storage than bacon cured in the absence of antioxidants. AA

2685 BERNTHAL (PH), GRAY (JI), MANDAGERE (AK), IKINS (WG), CUPPETT (SL), BOOREN (AM) and PRICE (JF). Use of antioxidant-coated salts as N-nitrosamine inhibitors in dry- and brine-cured bacon. J. Food Prot. 49(1); 1986; 58-61

Several experiments were completed to further evaluate use of α-tocopherol-coated salts as inhibitors of N-nitrosamine formation in fried bacon. Studies with dry-cured bacon prepared with various levels of α-tocopherol indicated that the chemical did not contribute to formation of N-nitrosodimethylamine (NDMA). N-Nitrosopyrrolidine levels for the α-tocopherol-treated bacon samples were generally below 5 μg/kg, which represents an average reduction of approximately 70%. Experiments were also done to evaluate the role of lecithin as a possible precursor of NDMA in brine-cured bacon. At concentrations used to disperse α-tocopherol in the curing brine, lecithin did not contribute to NDMA formation in bacon prepared with α-tocopherol-coated salts. AA

2686 USBORNE (WR), COLLINS-THOMPSON (DL) and WOOD (DS). Sensory evaluation of nisin-treated bacon. Can. Inst. Food Sci. Technol. J. 19(1); 1986; 38-40

Four independent trials were conducted on bacon samples cured with and without nisin to ascertain its effect on colour and palatability. Although in trial one, 9 out of 12 panelists were able to identify duplicate samples in a triangle test ($p < 0.05$), the remaining tests showed no significant differences among the samples. It was concluded that bacon samples, when pumped with 10-11% of brine containing 2000 or 4000 IU/mL of nisin, were generally acceptable with respect to colour and palatability of the final product. AA

2687 TANAKA (N), GORDON (NM), LINDSAY (RC), MESKE (LM), DOYLE (MP) and TRAISMAN (E). Sensory characteristics of reduced nitrite bacon manufactured by the Wisconsin process. J. Food Prot. 48(8); 1985; 687-92

Bacon with a culture of lactic acid-forming bacteria, Pediococcus acidilactici, plus 0.7% sucrose and 40 or 80 mg sodium nitrite/kg (Wisconsin Process), and control bacon with 120 mg sodium nitrite/kg but no lactic acid bacteria and sucrose, were produced at three commercial bacon plants under production conditions. The bacon was stored under refrigeration for 5 to 8 weeks, then subjected to sensory analyses by an experienced sensory panel. Quantitative descriptive visual analysis was performed on uncooked as well as cooked samples, and the cooked samples were served for quantitative descriptive sensory analysis. Results indicated that the test bacon with reduced amounts of sodium nitrite was as acceptable as the control bacon with no sugar and lactics, with the 80 mg/kg nitrite-bacon being the most preferred of all. These results and the results of botulinal

challenge and nitrosamine tests indicate that the test process can be a satisfactory alternative to processing bacon by the conventional procedure with 120 mg sodium nitrite/kg. AA

Ham

2688 PAROLARI (G), BELLATTI (M) and FRANCESCHINI (M). A quality test for Italian raw ham. **Industria Conserve. 60**(4); 1985; 285-9 (Italian)

2689 DELAQUIS (PJ), BAKER (R) and McCURDY (AR). Microbiological stability of pasteurized ham subjected to a secondary treatment in retort pouches. J. Food Prot. 49(1); 1986; 42-6

A ham processing procedure consisting of pasteurizing, packaging in retort pouches, and subjecting the hams to a secondary heat treatment was evaluated as a method of increasing microbial stability. Pasteurized hams reheated at 121 C for 10 minutes and stored at 1±1 C or 6±1 C showed no microbial growth after 6 or 12 months of stroage. The number of microorganisms in pasteurized hams not receiving the secondary heat treatment ranged from 10^3/g to $>10^8$/g and from 10^2 to $>10^8/cm^2$ on the surface after 3 to 5 months of storage. Pasteurized hams that had been inoculated with **Clostridium sporogenes** spores before pasteurization followed by a secondary heat treatment at 121 C for 10 minutes showed a delay in the occurrence of swollen packages when stored at room temperature compared to hams not receiving the secondary heat treatment. However, the secondary heat treatment did not prevent spoilage of hams. Ham that has not been treated to eliminate spores should be refrigerated. AA

2690 CAMPANINI (M), BARBUTI (S), GHISI (M) and BALDINI (P). Growth and/or survival at low temperature of enterobacteria isolated from spoiled raw hams. **Industria Conserve. 60**(4); 1985; 300-303 (Italian)

Poultry

2691 PADDA (GS), SHARMA (PD) and JOSHI (HB). The scientific basis of meat cookery. **Poult. Guide. 23**(4); 1986; 73-7

2692 BAWA (AS) and SUKHCHARAN JIT SINGH. Reduction of sodium content in processed poultry products. **Poult. Guide.** 23(7); 1986; 38-43

Poultry products normally contain NaCl (for optimal product flavour) and salts like sodium phosphate (for retention of juiciness). 30-50% of NaCl may be replaced by KCl. A higher level of substitution may adversely affect the taste and flavour of the final product. The Na content of some common poultry products and some common curing ingredients has been tabulated. KMD

2693 MANMATH PATNI. Studies on the use of soyameal as a major protein source in poultry ration in India. **Poult. Guide.** 23(4); 1986; 90-92

2694 SHUKLA (BK). Incidence of aflatoxins in poultry feed (maize) at Ajmer. **Poult. Guide.** 23(4); 1986; 93-5

Chickens

2695 SHARMA (BD), PADDA (GS), KESHRI (RC) and SHARMA (N). Studies on the development of chicken skin as a snack. **J. Food Sci. Technol. (India)** 23(2); 1986; 111-2

Chicken skin was cured in 2% NaCl solution at 4 C for 14 hours and subjected to (i) frying, (ii) pressure cooking and frying, (iii) pressure cooking, oven drying and frying (iv) oven drying and frying and (v) pressure cooking, mincing and frying. Pressure cooking was done at 1.02 kg/cm^2 for 4 minutes and oven drying at 120 C for 2

hours. The skins for all the treatments were fried separately in hydrogenated vegetable oil at 160 C for 4-6 minutes. After draining and cooling, the skins were finally fried at 200 C for 1-2 minutes to produce puffed appearance and crips texture. Average yields of the final products from (i) - (v) ranged between 18.25 and 24.33%. Raw chicken skin contained 52.25 moisture, 8.01% protein and 38.20% fat whereas those from various treatments had a composition of 4.31% moisture, 43.49% protein and 47.69% fat. Fat content was maximum in (v) (50.23 + 0.47%), whereas protein content was highest in (i) (44.32 + 0.10%). Chicken skin snack from (iii) was most acceptable although other treatments gave very good scores in general appearance, flavour, crispness and overall acceptability. KAR

Eggs

2696 SREENIVASAIAH (PV). Quality identification of shell-eggs. 1. Candling. **Poult. Guide.** 23(6); 1986; 38-43

Summarises current knowledge and practice relating to external appearance and candling of eggs; as well as internal characteristics; defects that can occur in eggs. Indian standard specifications for the grading and marketing of table eggs have been summarized in tabular form. KMD

2697 SREENIVASAIAH (PV). Quality identification of shell-eggs. 2. Defence mechanism in the egg. **Poult. Guide.** 23(6); 1986; 44-5

Provides short notes on the substances like lysozyme, conalbumin, avidin, ovomucoid, flavoprotein, ovoinhibitor, and ovomucin which gave a protective role to eggs. KMD

2698 SREENIVASAIAH (PV). Quality identification of shell-eggs. 3. Preservation of opened-out eggs. **Poult. Guide.** 23(6); 1986; 46-8

Gives an account of the procedure adopted for accelerated freeze drying of eggs, and preparation of egg powder. KAR

2699 ULMEK (BR). Prolong the life of fresh eggs. **Poult. Guide.** 23(7); 1986; 33-7

The author has given brief description of 4 commercial methods of egg preservation - viz., coating with oil, thermostabilization, refrigeration, and storage in a refrigerated room - and 2 sample methods for rural areas, viz. earthen pot and wooden egg cooler. KMD

2700 MA (CY), POSTE (LM) and HOLME (J). Effects of chemical modifications on the physico-chemical and cake-baking properties of egg white. Can. **Inst. Food Sci. Technol. J.** 19(1); 1986; 17-22

Egg white solids (EWS) were modified with succinic anhydride and a water-soluble carbodiimide. Both succinylation and carboxyl modification caused a shift in net charge but no marked changes in surface hydrophobicity or SH content. The surface and interfacial tensions were increased by succinylation. The denaturation temperatures (Td) of the proteins from both unmodified and carboxylmodified EWS were increased by the addition of 50% sucrose, whereas the Td's of the highly succinylated egg white proteins were not changed. Succinylation improved the emuulsification properties and lowered the foaming performance of EWS. The heat coagulability of egg white proteins at pH 7.2 was decreased by both modifications, while at pH 5.8, the highly succinylated (91.6%) EWS was relatively heat stable. The layer cake baking performance was improved by succinylation at both low (24.5%) and high (91.6%) levels of modification. Highly succinylated EWS, however, showed poor performance in an angel food cake system; this could be attributed to poor foaming properties and low heat coagulability. Carboxyl modification did not cause marked changes in functional and baking properties of EWS. AA

2701 BERGNER-LANG (B) and BEUTLER (HO). Enzymatic estimation of D-(-)-3-hydroxybutyric acid in egg products. **Dtsch. Lebensmittel-Rundsach.** 82(1); 1986; 23-7 (German)

An enzymatic method for the rapid and specific determination of D-(-)-3-hydroxybutyric acid (or β-hydroxybutyric acid) in egg products has been worked out. With its detection limit of 1 mg/kg dry matter, quantitative estimation limit of 2-3 mg/kg dry matter, one can say that its sensitivity and accuracy are very good, and comparable to those of the gas-chromatographic methods. Researches on egg products meant for the paste goods and baked products industry, and an eggs meant for incubation, confirm the earlier findings of Littmann et al. The maximum permissible limit for D-(-)-3-hydroxybutyric acid in egg products may be appropriately fixed at 10 mg/kg dry matter. KMD

SEAFOODS

2702 SANTOS (C), GARCIA (C) and MARINE (A). Tyramine content in food of animal origin. II. Fish and fish derivatives. **Rev. Agroquim. Tecnol. Aliment.** 25(4); 1985; 553-8 (Spanish)

Fish

2703 PICCINI (JL), EVANS (DR) and QUARANTA (HO). Comparison of TBA number of irradiated fish with sensory quality. **Food Chem.** 19(3); 1986; 163-71

A steam distillation method for the determination of the TBA number in control and irradiated hake and tuna is presented. Chemical values are compared with sensoric evaluation results for the 30-day cold storage period. Close correlation has been observed between the organoleptic scores and the oxidative rancidity in tuna loins and hake fillets, whether control or irradiated. AA

2704 DEY (VK) and SHENOY (AS). Freezing and storage characteristics of fish fillets from six varieties of fishes. **Seafood Exp. J.** 18(7); 1986; 17-20

Yield of skin-on and skin-less fillets was maximum from seer fish followed by halibut and minimum yield was obtained from catfish. Maximum shelf life of all fillets was 19 weeks (maximum period stored 25 weeks) at -20 C afterwards it became discoloured, rancid and was unacceptable. Total plate count fell in the initial storage of 5 weeks after which it remained steady. KAR

2705 TSUJI (K), FUKUYAMA (T), HIRAI (K), NATSUYAMA (R) and KOSUGE (T). A recent survey on toxicity of the Japanese ivory shell from Ganyudo area, Shizuoka prefecture, and identification of responsible toxins. Bull. Jpn. Soc. Sci. Fish. 52(2); 1986; 319-22 (Japanese)

2706 GOPALAKRISHNA IYER (TS) and VARMA (PRG). V. cholerae and marine products. **Seafood Exp. J.** 18(7); 1986; 23-4

The author has examined cases of cholera outbreak through seafoods, and the possibilities of survival of the organism, **Vibrio cholerae**, in sea-water and seafoods. Outbreaks of cholera have been traced, in most cases, to shell-fish and crustaceans, though one outbreak in Guam has been traced in a fin fish. In the Eastern hemisphere, it is the poor people, who live in insanitary conditions, who are mostly infected; among Westerners, however, it occurs more frequently among the class which, presumably, can afford to eat shell fish. KMD

Anchovies

2707 CESARE (LF). Fish protein concentrate from anchovies (**Engraulis encrasicholus**). **Food Sci. + Technol.** 18(6); 1985; 374-8

Carps

2708 KHAN (AA) and AL-MEHDI (MIA). Studies on the biochemical composition of the carp, **Cyprinion macrostomus** (Heckel) from Northern Iraq. **Indian J. Anim. Res.** 19(2); 1985; 112-8

Fresh water carp, **Cyprinion macrostomus** (Heckel) was studied for variations in biochemical composition of different regions of body flesh. Flesh of left and right side showed no consistent differences while flesh from head to tail and belly region showed greater variations. Fat content was minimum in the tail region and maximum in belly region. Moisture content was inversely related to fat content. A slight increase in protein concentration from head to tail was noted, while carbohydrates showed a decrease from head to tail. Ash and cholesterol were similar in all the regions except in the belly. Total P and its fractions along with some inorganic constituents like Ca, Na, K, Zn and Fe were also determined. They showed marked different body regions. MVG

2709 OKADA (T), INOUE (N) and AKIBA (M). Electron microscopic observation and biochemical properties of carp myosin B during frozen storage. **Bull. Jpn. Soc. Sci. Fish.** 52(2); 1986; 345-53

Capelin

2710 RAKSAKULTHAI (N), LEE (YZ) and HAARD (NF). Effect of enzyme supplements on the production of fish sauce from male capelin (**Mallotus villosus**). **Can. Inst. Food Sci. Technol. J.** 19(1); 1986; 28-33

Cod

2711 SHAW (SJ), BLIGH (EG) and WOYEWODA (AD). Spoilage pattern of Atlantic cod fillets treated with glucose oxidase/gluconic acid. **Can. Inst. Food Sci. Technol. J.** 19(1); 1986; 3-6

Atlantic cod fillets were subjected to two experimental treatments as potential means of prolonging freshness: (1) 30 seconds dip in glucose oxidase (1 unit/ml) plus glucose (4% w/v); and (2) 30 seconds dip in gluconic acid (0.125% w/v). A control group was dipped in tap water. The fillets were packed in 10-lb commercial containers and stored at 1-2 C for a 12 days period. Quality of the fillets was assessed microbiologically (total plate count, **Alteromonas putrefaciens**, and fluorescent pseudomonads), chemically (trimethylamine content) and organoleptically (raw quality grading and sensory assessment). Contrary to previous claims, both the enzyme and acid treatments showed insignificant inhibition of the microbial indicators, and few if any benefits were apparent in chemical, raw quality, or sensory assessment of the fillets. A glucose oxidase enzyme system for extending the shelf life of cod fillets was therefore considered to have little potential. AA

2712 CARDINAL (M), DUMAY (E) and CHEFTEL (JC). Influence of chemical and technological factors on the texture of gels made from ground cod muscle. **Ind. Aliment. Agric.** 102(12); 1985; 1273-82 (French)

The preparation of homogeneous and elastic gels from fresh cod muscle, using the traditional Japanese 'kamaboko' process, has been described. A cod fillet is cut into cubes, washed with water, drained, ground with food ingredients such as NaCl and starch, shaped with a mould, and heated in steam at 100 C for 30 minutes. The texture of

gels prepared from 8 different cods over a 4-month period (Dec-March) did not vary. Gels prepared from other fish - e.g. pout, saithe, and mackerel - had a texture similar to that of a cod gel, but were somewhat less elastic. Effects of varying conditions of cold storage, or washing with water, or draining intensity and final water content, have been reported. Addition of NaCl and potato starch (2.3 and 5 g respectively per 100 g of washed and drained muscle) was necessary for the development of gel elasticity. Addition of other food ingredients (4% sucrose, 5% oil etc) did not affect the gel texture significantly. KMD

Hake

2713 MOSCHIAR (S) and FARDIN (JP). Sorption properties of raw hake muscle. **J. Food Technol. 21(1)**; 1986; 95-102

Krill

2714 SEHER (A) and LOSCHNER (D). Natural antioxidants. V. Antioxidants and synergists of antarctic krill. **Fette Seifen Anstrichm. 87(11)**; 1985; 454-7 (German)

Addition of meat of antarctic krill (**Euphausia superba Dana**) to other food increases their resistance concerning the oxidative decay. It is possible to ioslate the antioxidative principle from krill and to separate it into a lipophile and a hydrophile fraction. The lipophile component is found as α-tocopherol the hydrophile as synergeticly efficient mixture of 13-20 free amino acids. AA

Mackerel

2715 KUNISAKI (N), TAKADA (K) and MATSUURA (H). On the study of lipid contents, muscle hardness and fatty acid compositions of wild and cultured horse mackerel. **Bull. Jpn. Soc. Sci. Fish. 52**(2); 1986; 333-6 (Japanese)

In this paper, we mainly investigated the relationship between the lipid contents and muscle hardness of wild and cultured horse mackerel. The lipid contents in the cultured type were 10-20 times as high as the wild type. On the other hand, the moisture contents in the cultured type were fairly low. The muscle hardness of the cultured type were 1/3 - 1/4 as compared to the wild type. No remarkable difference was seen in the protein contents, mineral contents and the fatty acid compositions between the wild and the cultured type. AA

Otolithus argenteus

2716 RAMANANDA RAO (D). Nutritive value of **Otolithus argenteus** fish meal. **Seafood Exp. J. 18(7)**; 1986; 13-5

Otolithus argenteus, a small fish caught by Indian trawlers, is usually sun-dried and converted into a powdery product that is marketed as fish meal. The author has described a method of preparing a fish meal of good quality as well as a method of preparing feed pellets using this improved meal. The pellets have been used successfully for the rearing and culturing of "choice fish", such as **Cyprinus carpio**, in inland waters. KMD

2717 RAMANANDA RAO (D) and RAMACHANDRAN (R). Effect of pre-chilling on the quality of canned fish. **Seafood Exp. J. 18(6)**; 1986; 19-21

Hypoxanthine present in jew fish or croaker (**Otolithus argenteus**) has been measured to assess the degree of spoilage of the fish, prior to canning. After 7 days of storage in ice, the hypoxanthine content in the raw uncooked fish increased from 0.56 to 1.16 μ moles/g, and the canned product made from this raw material was of

good quality. After 10 days of storage the hypoxanthine content increased to 1.88 μ moles/g and the canned product was very soft and mashy, and had lost its characteristic flavour. KMD

Ribbon fish

2718 SANTHANA KRISHNAN (G). Export potential of ribbon fish. **Seafood Exp. J. 18(7); 1986; 9-11**

Ribbon fish is at present being exported only to Japan. Development of the product and its assessment indicated that it has got potential market in Europe especially among the EEC countries. KAR

Whitings

2719 da PONTE (DJB), ROOZEN (JP) and PILNIK (W). Effects of additions, irradiation and heating on the activity of trimethylamine oxidase in frozen stored minced fillets of whiting. **J. Food Technol. 21(1); 1986; 33-43**

Clams

2720 GILL (TA), THOMPSON (JW) and GOULD (S). Thermal resistance of paralytic shell-fish poison in soft-shell clams. **J. Food Prot. 48(8); 1985; 659-62, 667**

Toxic soft-shell clams (**Mya arenaria**) were collected and the meats homogenized and tested for toxicity by the A.O.A.C. mouse bioassay procedure. The homogenate was incubated at temperatures ranging from 220 to 269.5 F and toxicities measured in samples heated for various time intervals. The relationships between toxicity and the time of heating were semilogarithmic for each of the six incubation temperatures. Decimal reduction times were calculated for each heat treatment and were plotted (log scale) against heating temperature. The thermal-destruction-time (TDT) curve was linear (r^2 = 0.97), indicating that the kinetics of paralytic shellfish poison destruction are similar to those of most microorganisms. The toxin levels were also analyzed by high performance liquid chromatography for 110 samples and although results compared favourably with the bioassay data, its reliability for routine assessment of toxicity was not clearly established. AA

Cuttle fish

2721 ZACHARIA (S). Raw material handling and processing of cuttle fish for 'IQF' fillets. **Seafood Exp. J. 18(7); 1986; 5-8**

Raw cuttle fish is a popular delicacy in Japan. The author has described how fillets of the Pharaoh cuttle fish (**Sepia pharaonis**) may be prepared and frozen in a most careful and hygienic way to meet the needs of the Japanese luxury food market. Details are given on the selection, handling, and transportation of raw material, and the procedure for freezing and packaging. Japanese bacteriological standards for frozen cuttle fish are also given. KMD

Lobsters

2722 ZACHARIA (S). Processing of rock lobster for whole cooked and frozen product. I. Selection of raw material, handling and transportation. **Seafood Exp. J. 18(4); 1986; 9-11**

Rock lobsters (Family Palinuridae) are exported from India as frozen, whole, and cooked lobster. The paper describes a standard procedure developed after conducting field trials for the processing of rock lobster, which includes selection of raw material, handling, and transportation. KMD

2723 ZACHARIA (S). Processing of rock lobster for whole cooked and frozen product. II. Processing methods. **Seafood Exp. J. 18**(5); 1986; 5-8

A method of cooking whole lobster at a constant boiling temperature has been described. Cooking is followed by cooling, cleaning, freezing, grading, and packing. If all these operations are performed correctly, it is possible to achieve a final yield of 93-95). KMD

Prawns

2724 MATHEN (C) and THOMAS (F). Net weight of prawns in frozen blocks and its determination. Seafood Exp. J. 18(6); 1980; 15-8

The factors that affect the measurement of net weight of prawns in frozen blocks - in order to decreasing importance - are (i) contact with water (ii) draining time;l (iii) temperature of the water and (iv) extent of thawing. A water temperature of 32 C or less has no influence on the drained weight. The extent of thawing is an important factor, but it is difficult to determine. Quantitative data on the effects of these factors have been presented in tabular form. KMD

Shellfish

2725 MADDEN (RH), BULLER (H) and McDOWELL (DW). **Clostridium perfringens** as an indicator of hygienic quality of depurated shellfish. **J. Food Prot. 49**(1); 1986; 33-6

A comparison of the recoveries of **Clostridium perfringens, Escherichia coli** and **Streptococcus faecalis** from naturally and artificially contaminated mussels and oysters was made. Only **C. perfringens** was regularly recovered from naturally contaminated shellfish. Laboratory studies showed that this was due to **C. perfringens** spores retaining viability significantly longer than vegetative cells of the other organisms tested, under marine conditions. Over 97% of presumptive **C. perfringens** colonies were confirmed as positive. A survey of mussels at 24 sites, over ca. 60 km of coastline, found **C. perfringens** at 23 but **E. coli** at only two of the sites. Therefore, enumeration of **C. perfringens** can indicate fecal pollution where enumeration of **E. coli** shows none. Also, confirmation of presumptive colonies may not be required, rendering enumeration more rapid. Despite the greater persistence of **C. perfringens** spores, studies in a commercial depuration tank showed that oysters were cleansed to an acceptable level using a standard 48 hour immersion. Depuration was found to be essential because all three organisms tested survived for a considerable period of time in oysters stored dry at 4 C, which is normal commercial practice. AA

Shrimps

2726 SANTHANA KRISHNAN (G). Examination of frozen shrimp. II. For fly and filth contamination. **Seafood Exp. J. 18**(4); 1986; 13-7

A detailed report on the methods adopted in the USA, for determination of fly and filth contamination in frozen shrimp has been described, which includes sample preparation, use of Wildman trap flask, trapping the filth, separating the filth material and microscopic examination. The terms "extraneous materials" and "filth" have been defined. Guidelines for quality control, and specifications for acceptance of the product are also reported. KMD

2727 MATCHES (JR) and LAYRISSE (ME). Controlled atmosphere storage of spotted shrimp (**Pandalus platyceros**). **J. Food Prot. 48**(8); 1985; 709-11

Spotted shrimp (**Pandalus platyceros**) were stored head on and head off on melting ice in air and controlled atmosphere for 14 days to test effects of controlled atmosphere on storage life of the

shrimp. Pure carbon dioxide was allowed to flow through the controlled atmosphere chamber at the rate of 0.5 L/min maintaining a 100% CO_2 atmosphere. Aerobic bacteria counts, ammonia, weight loss and sensory analyses were determined initially and after 7 and 14 days. Bacterial counts increased more rapidly and to higher levels in air pack than controlled atmosphere samples. The levels of ammonia were very low in the fresh shrimp and increased to 21 and 16 mg% in head-on and head-off air-pack samples, respectively. The levels reached only 12 and 6 mg% in similar samples stored in CO_2. Weight loss was greater for shrimp stored in CO_2 than in air. Sensory evaluation showed air-pack head-off samples to be unacceptable after 14 days of storage but CO_2 packed samples had only moderate discolouration and no detectable off-odours. These data show that spotted shrimp could be shipped on ice under controlled atmosphere to fresh fish markets. AA

Squids

2728 JOSEPH (J), PRABHU (PV) and MADHAVAN (P). Drying of squid. **Seafood Exp. J. 18(5); 1986; 9-12**

After a brief description of the characteristics of Indian squids and squid meat, the authors have described a procedure for the handling and chilling of squids on board the fishing boat, and their sun-drying on land. KMD

PROTEIN FOODS

Nil

FRUIT JUICES AND BEVERAGES

Apple juices

2729 GASIK (A) and HORUBALA (A). Effect of modification of apple juice production technology on polyphenols content and sensory properties. **Acta Aliment. Polonica. 11(25)(4); 1985; 385-96**

Cider

2730 ANON. The cider industry. **Ind. Aliment. Agric. 102(10); 1985; 1046-50 (French)**

The products of the cider industry are: cider, apple juice, apple juice concentrate, cider brandy, and other cider-based spirits. France is the biggest cider producer in the world, with its cider industry concentrated mainly in Normandy (Pays d'Auge) and Brittany (Ille-et-Vilaine). The author has prepared nine tables, indicating the (i) production of cider fruits; (ii) evolution of cider production and consumption; (iii) type of packing (bottles of different sizes); (iv) evolution of cider experts; (v) number of units engaged in the cider industry, and (vi) number of persons employed in the cider industry. The cider market can be reviewed only by a sustained effort at innovation, supported by a powerful publicity campaign. KMD

Coffee

2731 THALER (H). Examining coffee and Ersatz coffee. XX. Protein structures in roasted coffee. **Dtsch. Lebensmittel-Rundschau. 82(1); 1986; 1-4 (German)**

Beer

2732 OSTERDAHL (B-G). N-Nitrosodimethylamine in beer. **Varfoda. 37(8)**; 1985; 397-400 (Swedish)

Fifty-nine samples of beer (max. 4.5% alcohol, w/w) were analysed in 1985 for NDMA. NDMA was demonstrated in 48 samples at levels upto 0.6 µg/l, the mean level being 0.17 µg/l. The level of NDMA was somewhat lower in domestic beer than in imported beer. The mean level of NDMA in beer has decreased by about 80 % since 1980-1981. The variation in NDMA content has also been reduced in both domestic and imported beers. AA

Brandy

2733 POSTEL (W) and ADAM (L). Analytical characterization of Spanish brandies. 1. Products of the German market. **Dtsch. Lebensmittel-Rundschau. 82(1)**; 1986; 4-10 (German)

Wines

2734 BEZENGER (MC), NAVARRO (JM), ABBAL (P) and SABLAYROLLES (JM). Keeping track of a fermentation with the help of a personal micro-computer - Application to alcoholic fermentation in enology. **Ind. Aliment. Agric. 102(12)**; 1985; 1283-91 (French)

An economical system for keeping trace of 4 fermentations has been described. An apple II e, equipped with a time chart, a parallel graphic printer, two floppy-disc readers, and four serial cards, would permit the recording, storage, printing and graphic representation of a global state parameter (namely, the cumulative loss of weight) representing the evolution of an alcoholic fermentation. The captors, or sensors, used as simple electronic balances. KMD

2735 ANON. Relevant provisions concerning the production of fruit wine. **Confructa Studien. 29(4)**; 1985; 293-301

2736 ZUZOK (G), BAUER (H) and ZURN (F). Suitability of different apple varieties for the production of sparkling wines. **Confructa Studien. 29(4)**; 1985; 303-8

2737 GENNARO (MC), MENTASTI (E), SARZANINI (C) and PESTICCIO (A). Undesirable and harmful metals in wines. Determination and removal. **Food Chem. 19(2)**; 1986; 93-104

A method is described for the lowering or removal of the metal content of wines. For this purpose, a chelating material is employed, formed from cellulose functionalized with iminodiacetic acid. Its use allows, first, a preconcentration of metals present at trace levels and, secondly, a lowering or removal of undesirable metals. Possible matrix effects, both by organic and inorganic components, have been considered and allowed for in the analytical determination. AA

OILS AND FATS

Cottonseed oils

2738 FOMA (M) and NGEKA (K). A contribution to the study of oil, proteins and gossypol in cottonseed (var. Reba B50). **Oleagineux. 40(6)**; 1985; 335-7 (French)

Cottonseed var. Reba B50 contains 34.6% protein (N x 6.25), 39.3% oil and 1.43% gossypol (% dry matter). Oil is composed of the following fatty acids: myristic (0.8%), palmitic (26.8%), stearic and

oleic (16.9%) and linoleic (55.5%). Proteins were extracted with water and then with NaOH 1% or NaOH 1.5%, using extraction ratio 1:10 or 1:15. AA

Olive oils

2739 GRAMICCIONI (L), Di PROSPERO (P), MILANA (MR), Di MARZIO (S) and MARCELLO (I). Global migration from plastic materials into olive oil and isooctane: An experimental comparison. **Food Chem. Toxicol. 24**(1); 1986; 23-6

Global migration from several plastics (phthalate plasticized PVC, polyurethane, polyether-polyamide copolymer and silicone rubber) into olive oil, used as a liquid simulant for fatty foods, was compared with global migration into isooctane, which has been proposed as a new fatty-food simulant. The results showed that the isooctane test (involving contact for 2 hours at 40 C) is not suitable as a substitute for the olive oil test (contact for 10 days at 40 C) for some types of commercial plastic materials. AA

Soybean oils

2740 HARTMAN (L), LAGO (RCA) and ESTEVES (W). Determination of phosphorus in Brazilian soybean oils by the saponification method. **Fette Seifen Anstrich m. 87**(11); 1985; 458-60

The phosphorus contents of crude and degummed Brazilian soyabean oils were determined by a modified saponification method. The method consists in saponifying the oil with a 50% sodium hydroxide solution at 180 C, acidifying with hydrochloric acid, extracting the liberated fatty acids with hexane and determining the phosphorus in the aqueous solution spectrophotometrically as molybdenum blue. The determination requires less than 3 hours of work and shows good agreement with the ashing method of the American Oil Chemists' Society. The results showed that Brazilian crude soyabean oils contain less total phospholipids but proportionally more non-hydratable phosphatides than the North American ones, this being specially evident in the equatorial region of Brazil. The high content of non-hydratable phosphatides impedes the determination of acetone-insolubles in crude oils and the application of the conventional conversion factors of phosphorus into phosphatides. AA

Sunflower oils

2741 MILLER (N), PRETORIUS (HE), PLESSIS (LMdu) and WALT (WHVan der). The effect of hull lipids on sunflower seed oil quality. **Food Sci. + Technol. 18**(6); 1985; 333-4

Commercial sunflower seeds of the FH high oil type and commercial sunflower seed oil (SFO) were stored at 25 C and 50% relative humidity (rh) and 30 C and 80% rh, respectively. Mould growth was inhibited during storage. Quality criteria such as free fatty acids, induction periods, anisidine values, peroxide values, ultraviolet absorption and tocopherols were determined. The results were subjected to three-way anlaysis of variance. Kernel oil (KO) was compared to whole seed oil (WO) and sunflower oil (SFO). According to storage stability and quality parameters the oils could be arranged as KO > WO > SFO. AA

Fats

2742 41st ANNUAL MEETING OF GERMAN SOCIETY FOR FAT SCIENCE, 8-12 Sept. 1985. **Fette Seifen Anstrichm. 87**(11); 1985; 425-54

The proceedings of the meeting, as well as summaries of the Festival Address. 3. Plenary Addresses, and 90 papers are reported here.

Festival address: WEISS (A) - Fat-Silicate Complexes. Plenary Addresses: SEN GUPTA (AK) - Recent developments in edible oil refining; BOGGS (RW) - Sucrose polyester - A non-caloric fat; IPPEN (H) - Skin tolerance of external products. Papers were grouped as follows: General and Analytical Chemistry of Fats (11 papers), Oilseeds (5 papers), Fat as food (7 papers). KIELMEYER (F) and SCHUSTER (G) - Influence of emulsifiers on the behaviour of fat in ice-mix during ripening; ZEDDELMANN (H.von) - Further experience with the DGF methods for evaluation of roasting and cooking (boiling) fats; BEGEMANN (O) - Experiences in the evaluation of used frying fats; WEBER (N), WIECHEN (A), BUCHHEIM (W) and PROKOPEK (D) - Changes of soya lecithin in cheeses; KANKARE (V) - Determination of the melting properties of edible fats by the DSC method; PETERSSON (B) and ANJOU (K) - Pulsed NMR method for solid fat content iln mixtures of milk fat and cocoa butter, or equivalents; KALO (P), PARVIAINEN (P), ALI-YRKKO (S) and ANTILA (M) - Influence of re-esterification on the triglyceride composition. Fats and Oilseeds as Feed Materials and Feed Material Technology (9 papers); Waxes and Wax Products (2 papers); Biological and Clinical Chemistry of Lipids (13 papers); Cosmetics and Lipid Containing Agents for External Application (10 papers); Processing Technology, Machinery and Apparatus: Distillative and extractive operations in oil chemistry (6 papers); Processing of edible oils (7 papers); Oil Recovery Processes (9 papers). SCHNEIDER (FH) and RUTTE (U) - Structure of rapeseed hulls - Influence on the water/hexane bond; PERED (J) and BORODI (A) - Energy saving in the processing of sunflower seeds - Utilization of sunflower husk as fuel in a large plant; MUNCH (EW) - Removal of aflatoxin from feed materials; ZAJIC (J) - Influence of air-conditioning on the phospholipid content in pressed rapeseed oil; SCHNEIDER (FH) and KHOO (D) - Separating presses - Existing situation and problems of analytical description; BRUNNER (G) - Possibilities of gas extraction in the area of fats and oils; LACK (E) and MARR (R) - High-pressure extraction of rape with emphasis on material exchange investigations; EGGERS (R), HAGEN (R) and SIEVERS (U) - On the present position of continuous extraction of solids with super-critical gases; MOLLER (P) and TOLBOE (O) - Industrial possibilities of supercritical extraction - an outsider's view; **Ecology**, Environment Protection, and Work Safety (5 papers); KUNTZE (E) - Water, waste water, environment protection - Existing legal problems; LIEBE (HG) and MUNCH (EW) - New method for the reduction of strong-smelling emissions; RICHTERICH (K) and GODE (P) - Ecological evaluation of a new non-ionic antifoaming agent; MORPER (M) - Effluent treatment in plants of the edible fat and dairy products industry, by anaerobic pre-treatment in the plants own clarifying unit; WURST (E), PUCHINGER (L) and KOLAR (H) - Lipids in sound and emission-damaged fir needles (**Picea abies**). KMD

2743 MARTINENGHI (GB). Enzymes in oils and fats technology. **Ind. Aliment.** 25(5); 1986; 365-71

The experimental research of the last five years on the enzymatic treatments in fat splitting, interesterification, transesterification and esterification have achieved promising results as regards the possible application on industrial scale. AA

Sat fat

2744 GROVER (MR), MADHURI MOTGHARE, SARMA (MV) and MATHEW (TV). Studies on physicochemical characteristics of sal (**Shorea robusta** Certn. f) seed fat - its suitability for edible uses. **Res. Ind. 30**(4); 1985; 386-9

Physicochemical characteristics (moisture, volatile matter, acid value, saponification value and iodine value) of sal seed kernel fat (raw and refined) are presented in this paper. Fatty acid composition of sal fat has also been compared with other fats. Its suitability for

edible purposes has been indicated. AA

Ghee

2745 ISKANDER (MH) and SHALABI (SI). Studies on production of a ghee-like product from vegetable fats. **J. Food Technol. 21**(1); 1986; 89-94
A typical ghee flavour was obtained by heating vegetable fats with fermented milk or fermented whey at 125 C for 2 minutes. The resulting product had an acceptability preference and better stroage stability than the untreated vegetable fat. It is suggested that whey proteins and fermentation products are the major contributors to development of ghee flavour in vegetable fats. The increase in storage stability could be due to the formation of reactive sulphydryl groups from whey proteins during the heating process. AA

SPICES AND CONDIMENTS

Cinnamon

2746 PAOVALO (C) and CHULASIRI (MU). Bacterial mutagenicity of fractions from chloroform extracts of Ceylon cinnamon. **J. Food Prot. 49**(1); 1986; 12-3
Further to a previous report (Food Chem. Toxicol. 22:109-112, 1984) describing the presence of mutagens in a chloroform extract of Ceylon cinnamon (**Cinnamomum zeylanicum** Nees), we report here our findings on the mutagenicity of silica gel column chromatographic fractions from this extract. Mutagenicity was evaluated by the **rec** assay using **Bacillus subtilis** strains H17 (rec^+) and M45 (rec^-). Fractions collected after elution with chloroform, chloroform-ethanol (98:2) and (95:5) exhibited mutagenicity, while those obtained by elution with chloroform-ethanol (85:15), (75:25) and ethanol showed no such activity. AA

SENSORY EVALUATION

2747 GORDON (NM) and NORBACK (JP). Choosing objective measures when using sensory methods for optimization and product positioning. **Food Technol. 39**(11); 1985; 96,98-101

2748 MASTRIAN (LK). The sensory evaluation program within a small processing operation. **Food Technol. 39**(11); 1985; 127-9

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

2749 WARNER (RD) and GORDON (JC). Integrated pest management of insects in food product. **Dairy Food Sanit. 6**(1); 1986; 4-9
Discusses: Identifying stored-product insects and estimating their population densities; densities and anatomical features; and general characteristics of some common stored insect pests of foods. BSN

2750 AHMED (S) and GRAINGE (M). Potential of the neem tree (**Azadirachta indica**) for pest control and rural development. Econ. Bot. 40(2); 1986; 201-9

BIOCHEMISTRY AND NUTRITION

2751 CRANEY (S) and LACHANCE (PA). The effect of chronic sodium benzoate consumption on brain monamines and spontaneous activity in rats. **Nutr. Rep. Int.** 32(1); 1985; 169-7

Sodium benzoate, a widely used antimicrobial additive for foods, was fed at 0.0, 0.1, 0.5 and 1.0% levels of the diet to rat brains during pregnancy and lactation and to their offspring after weaning. The data suggest that chronic ingestion of NaB during the developmental period has no detrimental effect on food intake, body weight gain, spontaneous motor activity or brain monamine levels. KAR

2752 MARTIN (CRA). Biochemistry of iron. **Br. Food J. 87**(928); 1985; 130-31

Discusses briefly the role of iron in health and ill health and inhibitory factors in the absorption of iron in the human body. BSN

2753 IHEKORONYE (AI). Rapid **in vitro** enzymic predictive model for the in vivo digestibility of food proteins. J. Food Technol. 21(1); 1986; 81-7

The absorbance of the deep orange colour produced by incubating protein hydrolysates with trinitorbenzene sulphonic acid was used to follow the liberation of free amino groups. **Five animal** and five plant proteins were hydrolysed with pepsin-pancreatin and papain-pronase E and aliquots were taken every 4 hour. To facilitate proteolysis, the proteins were presolubilized in 0.05 M HCl at 70 C for 2 hour with 1.0 ml 0.8% mercaptoethanol added to reduce disulphide bonds. An increase in absorbance occurred in all enzymatic digests between 8-20 hours incubation. No further hydrolysis took place after 20-28 hour incubation. The extent of the hydrolysis **in vitro** correlated with **in vivo** measurements of digestibility and so may serve as a more rapid predictor of digestibility. AA

2754 FERRANDO (R). Toxic amino acids - amines - nitrosamines. **Indian Food Packer. 40**(2); 1986; 13-22

The article, a part of which appears in this issue published under the series traditional and non-traditional foods. II', covers the main factors that relate to food toxicity under certain conditions in the presence of amino acids, amines and nitrosamines in foods. KAR

2755 AGNEW (J). A review of the effects of high altitude on nutrition in man. **Nutr. Rep. Int.** 32(1); 1985; 187-91

The review presents the effects of high altitude on the body's use of basic nutrients. KAR

2756 WYATT (CJ), MacBRIDGE (DE) and OWSTON (C). Nutrients in prepared food items. **Nutr. Rep. Int. 32**(3); 1985; 597-608

Cooking showed little effect on proximate components. Loss of minerals during cooking was minimal. Ascorbic acid was affected the most by conditions of cooking. Niacin, vitamin B12, pantothenic acid, carotene and retinol were quite stable. Thiamin, riboflavin, vitamin B6 and folacin values before and after cooking valued. Cooking was done as per the recipe suggested by USDA. KAR

2757 RAJINI (PS), MURALIDHARA, KRISHNAKUMARI (MK) and MAJUMDER (SK). Protective effect of a few dietary fibres on pirimiphosmethyl induced toxicity in albino rats. **Nutr. Rep. Int. 32**(3); 1985; 615-21

The protective effect of cellulose, agar agar, and pectin at 10% level was assessed in albino rats orally adminsitered a sublethal dose (200 mg/kg body weight) of pirimiphos-0methyl, for two weeks. The overall toxicity of Pirimiphos-methyl was lower in the fibre supplemented rats. Minimum inhibition of the plasma CLE and brain NSE activities were observed among the rate fed 10% pectin supplement. KAR

TISSUE CULTURE

2758 BANTHORPE (DV), BRANCH (SA), NJAR (VCO), OSBORNE (MG) and WATSON (DG). Ability of plant callus cultures to synthesize and accumulate lower terpenoids. **Phytochemistry. 25**(3); 1986; 629-36

TOXICOLOGY AND HYGIENE

2759 GONZALEZ (MJ). Contamination of foods by polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCBs) and heavy metals. **Rev. Agroquim. Tecnol. Aliment. 25**(4); 1985; 507-20 (Spanish)

A review on the levels of PAH, PCBs, and heavy metals (Cd, Pb and Hg) in foods, as well as on the techniques used for their determination and on the toxicological evaluation of this contamination, is carried out. AA

2760 BLACKWELL (JH), CLIVER (DO), CALLIS (JJ), HEIDELBAUGH (ND), LARKIN (EP), McKERCHER (PD) and THAYER (DW). Foodborne viruses: Their importance and need for research. **J. Food Prot. 48**(8); 1985; 717-23

All viruses known to be normally transmissible through foods and of concern to human health emanate from the human intestine. The outbreaks of hepatitis A and recently of gastroenteritis attributed to Norwalk-like viruses most likely developed from feces-contaminated fingers of infected food handlers or water polluted with feces. With few exceptions no recorded outbreak has depended on the ability of virus to withstand even limited heating in food. New and better methods of detection are needed for hepatitis A and Norwalk viruses in foods. It has been well documented that international trade in food products of animal origin can result in the introduction of animal disease into areas in which the disease does not exist. This fact has given rise to programs of research and development for industrially applicable technology to rid animal products from the agents of animal diseases. The survival of viruses inclusive of etiological agents of food-and-mouth disease, African swine fever, swine vesicular disease and hog cholera virus is reviewed in this paper and new research approaches are suggested. The general need for additional research of foodborne viruses is discussed. AA

2761 ROTHENBERG (PJ), STERN (NJ) and WESTHOFF (DC). Selected enrichment broths for recovery of **Campylobacter jejuni** from foods. **Appl. Environ. Microbiol. 48**(1); 1984; 78-80

2762 WAGNER (MK) and BUSTA (FF). Influence of a minimal change in pH on germination of **Clostridium botulinum** 52A in media containing sodium acid pyrophosphate and potassium sorbate. **J. Food Prot. 48**(8); 1985; 693-6

The influence of 0.4% sodium acid pyrophosphate (SAPP) or 0.26% potassium sorbate (PS) on **Clostridium botulinum** 52A growth and toxi-

city from spores was studied at two pH levels 5.55 and 5.85. Absorbancy measurements at 630 nm were used in combination with microscopic evaluations and toxin analysis to compare effects of additives on normal cell development. Treatment cultures containing 0.4% SAPP and 0.26% PS at a higher pH of 5.85 showed no increase in absorbancy and no sign of toxicity, but elongated vegetative cells (> 9 um) were observed using phase contrast microscopy rather than scanning electron microscopy. The SAPP-PS treatment culture at a lower pH of 5.55 displayed no signs of growth spectrophotometrically or microscopically, as well as no toxicity. These data suggest that a SAPP-PS combination in a laboratory medium at pH 5.85 does not halt germination and outgrowth, yet may prevent cell division; whereas, the same treatment at pH 5.55 inhibits normal spore germination. AA

2763 HARMON (SM), KAUTTER (DA) and HATHEWAY (CL). Enumeration and characterization of **Clostridium perfringens** spores in the feces of food poisoning patients and normal controls. J. Food Prot. 49(1); 1986; 23-8

The fecal spore enumeration method for confirming **Clostridium perfringens** as the cause of food poisoning was evaluated using strains implicated in nine outbreaks in the United States. Confirmed spore counts from 66 stool specimens were made on tryptose-sulphite-cycloserine (TSC) without egg yolk and trypticase soy-sheep blood (TSB) agars. Counts from outbreak stools on TSC agar ranged from 2.0 x 10^4 to 3.5 x 10^8 (mean > 1,4 x 10^6 /g) as compared with <10^3 to 5.0 xc 10^5/g (overall mean 9.5 x 10^3/g) from normal stools. Similar results were obtained with TSB agar. Isolates from seven of the nine outbreaks were nonhemolytic and produced >100 ng enterotoxin/ml in spore broth, as measured by an enzyme-linked immunosorbent assay. Spores in stools from six of the outbreaks were heat-resistant and survived heating from 30 to 60 minutes at 100 C in cooked meat medium. Strains from the three remaining outbreaks were heat-sensitive and survived heating for only 15 minutes at 100 C. Enterotoxigenic isolates from all but one of the outbreaks were serotyped. In all instances, the predominant strain in specimens from an outbreak was of the same serotype, indicating that it was the causative strain. Reexamination of five specimens from each of three outbreaks after storage at -20 C for 6 months showed only a minimal reduction in the spore counts. AA

2764 ANDREWS (WH). Resuscitation of injured **Salmonella** spp. and coliforms from foods. J. Food Prot. 49(1); 1986; 62-75

This paper reviews various factors that affect the recovery of **Salmonella** spp., which include: (a) sample rehydration, (b) period of preenrichment, (c) incubation in both aerobic and anaerobic environments, (d) media composition and (e) the relative merits of preenrichment and direct selective enrichment. Because resuscitation of injured **Salmonella** cells does not occur during the selective enrichment step and beyond, the effect and interaction of these factors are considered primarily for the preenrichment step of the isolation procedure for **Salmonella**. This paper also reviews five methods recently developed for recovery of coliforms, which include: (a) hydrophobic grid membrane filtration, (b) radiometry, (c) electrical impedance, (d) fluorogenic assay and (e) the Petrifilm system. Each of these methods may incorporate a step for resuscitation of injured organisms. AA

2765 LIN (HH) and COUSIN (MA). Detection of mold in processed foods by high performance liquid chromatography. J. Food Prot. **48**(8); 1985; 671-8

A high-performance liquid chromatographic (HPLC) method was developed to analyze for the degree of mold contamination in processed

fruit and vegetable products. The method is based on detection of glucosamine, a breakdown product of chitin which is one of the major constituents of fungal cell walls. Food samples were hydrolyzed at 121 C for 2 hours to release glucosamine from fungal chitin. The hydrolysates were partially purified by passing them through a Dowex-50 cation exchanger. Effluents were derivatized by o-phthalaldehyde and the fluorogenic reaction products were separated by reversed-phase HPLC and detected by a spectrofluorometer. Six species of mold, **Alternaria alternata, Alternaria solani, Colletotrichum coccodes, Fusarium oxysporum, Geotrichum candidum** and **Rhizopus stolonifer**, which are commonly associated with fruit and vegetable products, were used in this study and different levels (0.1 to 2.5 mg/g of sample) of mold mycelium were added to rot-free tomato products. A linear relationship between concentration and glucosamine was observed. However, different species of mold gave different amounts of glucosamine. The effect of insect contamination on the assay was negligible unless high levels were present. Results obtained by the HPLC method were compared with those obtained with an amino acid analyzer and reasonable correlation between the two methods was evident. AA

2766 FUCHS (R), HULT (K), PERAICA (M), RADIC (B) and PLESTINA (R). Conversion of ochratoxin C into ochratoxin A **in vivo. Appl. Environ. Microbiol. 48(1); 1984;' 41-2**

2767 WEI (Y-H), LU (C-Y), LIN (T-N) and WEI (RD). Effect of ochratoxin A on rat liver mitochondrial respiration and oxidative phosphorylation. **Toxicology. 36(2,3); 1985; 119-30**

2768 EL-GAZZAR (FE) and MARTH (EH). Toxigenic and nontoxigenic strains of **Aspergilli** and **Penicillia** grown in the presence of sodium chloride cause enzyme-catalyzed hydrolysis of protein, fat and hydrogen peroxide. **J. Food Prot. 49(1); 1986; 29-32**

Eight strains of **Aspergillus flavus**, three of **Aspergillus parasiticus**, one of **Aspergillus ochraceus** and ten of **Penicillium** spp. were evaluated for their ability to hydrolyze protein, fat and hydrogen peroxide when the molds were grown in the presence of different amounts (0-10%) of sodium chloride. Proteolytic and lipolytic activities of strains of **A. flavus** generally increased with an increase in the amount of sodium chloride in the medium. This was true for proteolytic and less so far lipolytic activity of **A. parasiticus** and **A. ochraceus**. Of the penicillia tested, five exhibited a marked increase and five a smaller increase in proteolytic and lipolytic activity at 2, 4 and 6% sodium chloride, but such activity either remained constant or decreased at 8 and 10% sodium chloride. Peroxidase activity in mycelia of all strains of aspergilli increased with an increase of sodium chloride in the medium. Most strains of **Penicillium** spp. exhibited maximum peroxidase activity at 2% sodium chloride, and some reduction in activity when the amount of sodium chloride in the medium exceeded 2%. AA

2769 ANURADHA SINHA and RAMESHA RAO (A). Embryotoxicity of betel nuts in mice. **Toxicology 37(3,4); 1985; 315-26**

The fetotoxic potential of betal nuts was investigated in Swiss albino mice. Total aqueous extracts of ripe betal nuts of unprocessed and processed varieties were administered to pregnant animals at dose levels of 1,3 and 5 mg/day/mouse (27+1 g body weight) through days 6-15 of gestation. The dams were sacrificed prior to term and the fetuses were examined for morphological, visceral and skeletal anomalies. The treatments resulted in increased resorptions as well as dead fetuses. Fetal weight was adversely affected as indicated by the dose related reduction in average body weight of live fetuses. No major

morphological, visceral and skeletal defects, apart from hematomas, curved tails and a few incidences of rib anomalies, were observed. There was, however, a dose-related decrease in the number of fetuses possessing ossified coccygeal vertebrae while an increase in the number of fetuses with unossified 5th metacarpals. This indicated a delay in skeletal maturity, particularly in those fetuses exposed pre-natally to the betal nut extract of the unprocessed variety. AA

2770 PILET (Ch). Hygiene in the agro-food industries. Ind. Aliment. Agric. 102(10); 1985; 1077-81 (French)

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Regd. No. 36729/84

Printed and Publisned by Dr. B. L. Amla, Director, Central Food Technological Research Institute, Mysore 570 013 at C.F.T.R.I. Offset Printing Unit. Editor : Shri S. V. Sangameswaran, C.F.T.R.I. Mysore